

## **Aristotle distinguishes two kinds of necessity**

(a) Hypothetical

(b) Simple (Absolute, Material, Accidentally)

According to Aristotle other accounts of nature ignore final causes. They try to explain everything in terms of the material cause. But the final cause is crucial.

### **Hypothetical Necessity:**

With respect to the final cause things come about with hypothetical necessity. Example: A wall is necessary given that a house is to be constructed.

Hypothetical necessity has the form

If  $A$ , then necessarily  $B$  -  $A$  is the hypothesis - so  $B$  is hypothetically necessary, given  $A$ .

If there is a house, then necessarily there is a wall

If there is the power of sight, then necessarily there is an eye.

If there is to be cutting, then there is a saw

If there is to be a saw, then it is made of iron

### **Material necessity:**

What follows from the properties of the matter from which something is made follows with material, (or accidental, or simple,) necessity.

Example: Iron is heavy, so saws are heavy with material necessity. It is materially, or accidentally, necessary that saws are heavy.

### **Biological Explanations**

The biologist investigates the materially necessary consequences of the existence of living things in particular environments.

If there is to be a living thing in a particular environment, then ... there will be a means (= organs) of nourishment there will be a means of (= organs) defence there will be a means of (= organs) reproduction etc.

### ***Reading 7: Examples of Biological Explanations.***

1. The theory of the camel and of the parts of the camel.

#### ***Parts of Animals, Book 3, ch. 2. The Theory of Horns.***

[a] problem: why do horns exist [i.e. what is the final cause of horns]

Observations about horns:

(1) found only in animals that give birth live

(2) no polydactylous (i.e. having many digits - fingers or toes) animal has horns

Explanation: horns are defensive weapons and polydactylous animals have other means of defence. e.g. claws, teeth

(3) most cloven-footed animals have horns.

(4) there are horns where an animal has not been provided with another means of defence - e.g. claws.

‘In no case, however, does nature ever give more than one adequate means of protection to one and the same animal.’

(5) Note the form of Aristotle’s explanations: It is reasonable that where there are a pair of horns one is on each side of the head and that a single horn is located in the centre of the head. Note the explanation of the position of the bull’s horns on its head - in terms of the goal to be achieved - delivering blows with greatest force and greatest range.

The material cause of horns:

The logic of the discussion: ‘Let us now consider the character of the material nature whose necessary results have been made available by rational nature for a final cause.’

A large animal has more earthy matter. Earthy matter is used to form bone. Excess earthy matter in large animals is used by nature as weapons. Some becomes teeth and / or tusks and / or horns. This explains why no animal with horns has front teeth in both jaws: ‘nature by subtracting from the teeth adds to the horns’. Where bony matter does not become horns, it becomes teeth or tusks.

A camel is large in size and so has excess earthy matter but it does not have horns since it has another means of defence. Its great size.

### ***Parts of Animals, Book 2, ch. 14 The Theory of Stomachs.***

1. Why do stomachs exist? [i.e. what is the final cause of stomachs?] Intake and discharge cannot take place at the same point. Stomachs connects intake and discharge points.

2 The varieties of stomachs.

There is single stomach in animals with teeth in the front of both jaws. A large animal which feeds on thorny and ligneous food may have several stomachs. Example: the camel has no horns and no upper front teeth.

Explanation: it is more essential for the camel to have multiple stomachs than to have upper front teeth. Its food is thorny and its tongue necessarily made of a fleshy substance, so ‘nature’ uses the earthy matter saved by not being used as teeth to give hardness to the palate.

### **2. Aristotle’s Theory of Sexual Differentiation and Sexual Reproduction.**

#### ***Generation of Animals, Book 4.***

#### **Chapter 1:**

The problems of sexual differences

Problem 1: Why are males and females distinct? Why do they not constitute different species?

Problem 2: Where does sexual differentiation occur and what causes it?

Observation - Differentiation is found in the embryo

Aristotle rejects some earlier, alternative, theories:

- (1) Sex depends on the location of the embryo [Anaxagoras]
- (2) Sex depends on the temperature of the uterus [Empedocles]

A thought experiment: Put a male embryo into a cold uterus and a female embryo into a warm uterus. According to Empedocles the male should be female and the female male. Aristotle insists that this is impossible. - But how does Aristotle know this?

According to Aristotle, to explain the difference between male and female is to explain the origin of the difference between their sexual organs. This cannot be explained by temperature difference.

Another proof: Male and female twins are found in the same uterus.

Aristotle's account of the origin of and reason for different sex organs.

Male and female are distinguished by their capacities. The male can concoct and discharge semen - carrying with it the form of the father. So the male provides the form and moving cause for development. The female receives but cannot form and discharge semen. The female is colder, so blood is more abundant in certain regions of her body. Contrary to the usual belief, the quantity of blood in menstruation indicates that females are cooler than males. They are not as able to cook up and concentrate the blood.

The male is able to reduce the residue from nutrition to its most concentrated form. Male and female sex organs differ because of their differing abilities to concentrate blood and ultimately this is due to differences in their hearts.

The male is a principle and cause in virtue of his capacity the female in virtue of her incapacity. The capacity in question is the capacity to concoct blood. So first principle of differentiation of male and female is the heart.

The reason that offspring are male or female: Semen is the final residue of nutrition - carried to every part of the body. It picks up information about each part of the body. The semen of the male carries the form and principle of movement. The secretion of female contains matter alone. The sex of embryo and degree of resemblance to parents or more distant ancestors depends on the extent to which the activity of the form contributed by the male overcomes the passivity of the matter contributed by the female.

## Chapter 2:

Observations to support the claim that the production of male or female depends on which principle prevails: More females are produced by the young and the old. More feminine males produce daughters rather than sons. More liquid semen results in a daughter rather than a son. More daughters are born when the wind is blowing from the north - bodies are more liquid - more residue is produced. Menstruation occurs with the waning of the moon when the month is cooler / moister. Shepherds say that it makes a difference which way the animal is facing when copulating.

### Chapter 3:

The reason why offspring resemble their parents and ancestors more or less: Males resemble their fathers females their mothers. Some offspring do not even resemble human beings:.

“For even he who does not resemble his parents is already in a certain sense a monstrosity; for in these cases nature has in a way departed from the type. The first departure indeed is that the offspring should become female instead of male; this, however, is a natural necessity.”

Females are accidentally necessary. Aristotle's famous remark:

“And the monstrosity (i.e. females), though not necessary in regard of a final cause and an end, yet is necessary accidentally.”

Properly concocted menstrual fluid will be moved by the male principle of the father to produce a likeness of the father. If the activity of the male form prevails but not as the form of the father, the embryo will be male and like the mother, if the father's principle prevails but not as male the embryo will be a female like the father.

What generates is an individual male and the goal is to reproduce that individual male. Where the individual cannot prevail, the more remote and prevails so offspring resemble their grandparents and their more remote ancestors.

Aristotle says that the male form carries information about all the male ancestors of the father, the more remote the ancestor the less active it is in reproduction. He ought to have said that it contains information about all the ancestors of the father so as to allow offspring which resemble e.g. a paternal grandmother. He also, apparently inconsistently (because it is passive matter, not form), holds that the female principle contributes information about all the female ancestors of the mother. This way he provides an explanation of how offspring resemble their ancestors. If none of these principles is effective then offspring will resemble none of the ancestors but will still be a human being. In the extreme case not even form of human being will be effective and the offspring will be a 'monster'.