Heredity and Evolution: Meaning of Heredity, Aristotle's Model of Inheritance

Introduction

- The passing on of traits from parents to their offspring is called Heredity.
- Heredity is also known as inheritance or biological inheritance.
- This takes place either through sexual reproduction or asexual reproduction.
- The genetic information of the parents is acquired by the offsprings.
- Genetics is the study of heredity in Biology.
- Cryptophasia is the language which can be understand only by the twins.
- Twin formation can be of two types:

Monozygotic

- The twins are the ones which are formed from one zygote.
  - Splits into two embryos.
  - Twins are identical to each other.

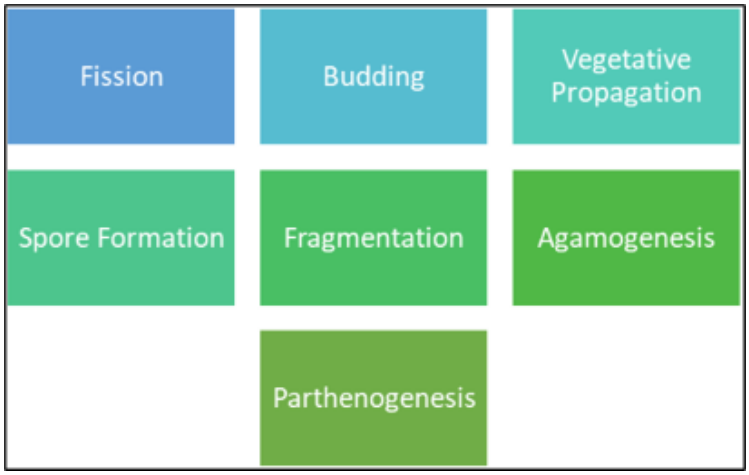
Dizygotic

- The twins are fraternal in dizygotic twins.
- The twins are not identical.
- Reproduced from separate eggs being released simultaneously from the ovary.
- Subtypes of twins:
  - Boy-boy
  - Boy-girl
  - Girl-girl

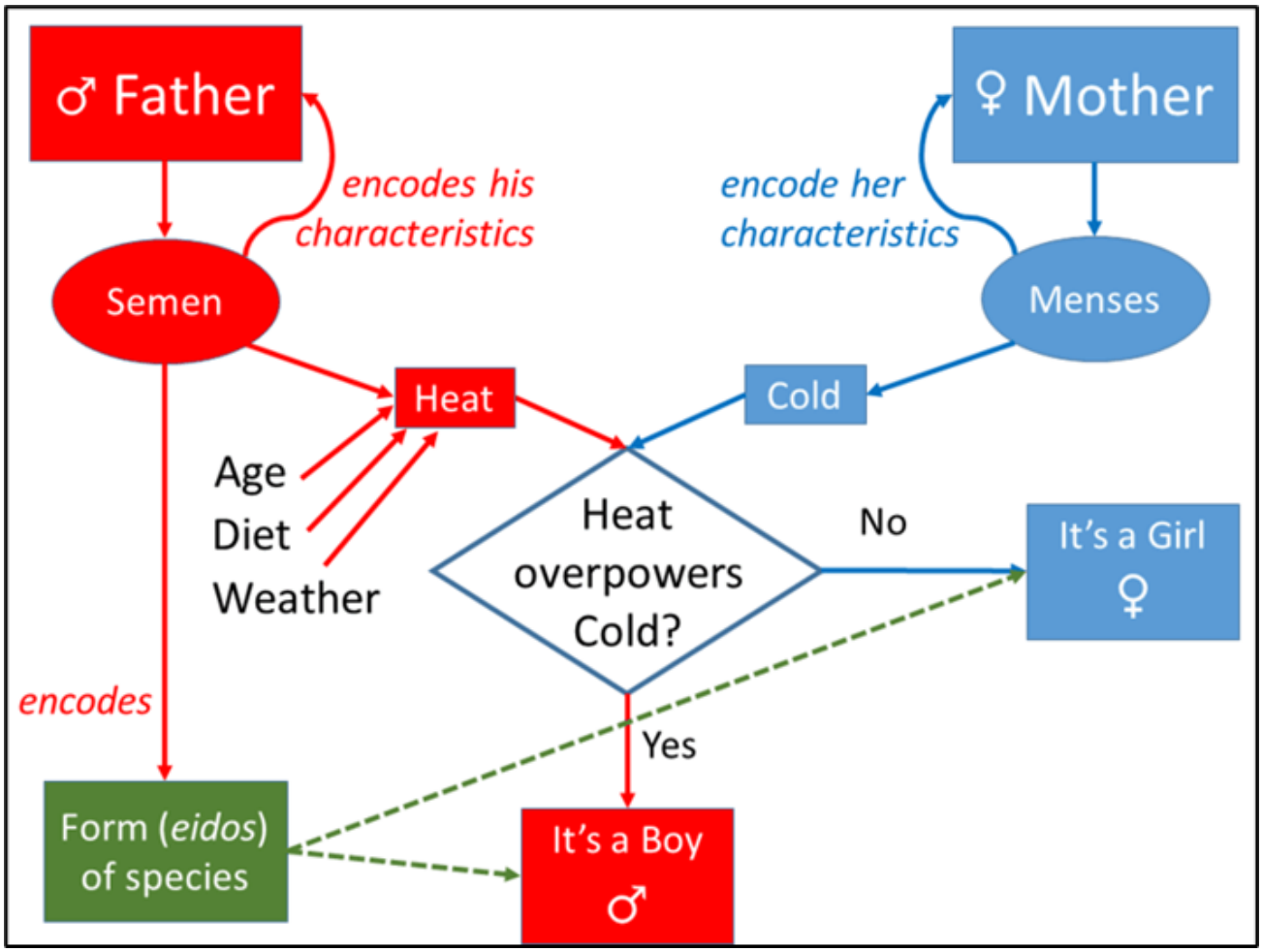
Asexual Reproduction

- This reproduction involves the fusion of gametes or change in the number of chromosomes.
- It is the primary form of reproduction for single-celled organisms such as archaea and bacteria.
- Several eukaryotic organisms including plants, animals, and fungi can also reproduce asexually.

Types



Aristotle’s Model of Inheritance



Modern Development of Genetics and Heredity

- The gap between experimental geneticists and naturalists was bridged by the modern synthesis.
- With known genetic mechanisms including the observational evidence of naturalists, all evolutionary phenomena can be explained.
- The evolution process is gradual:
  - Small genetic changes
  - Recombination ordered by natural selection
- Selection is overwhelmingly the main mechanism of change.
- The primacy of population thinking:
  - The genetic diversity carried in natural populations.
  - The strength of natural selection in the wild.

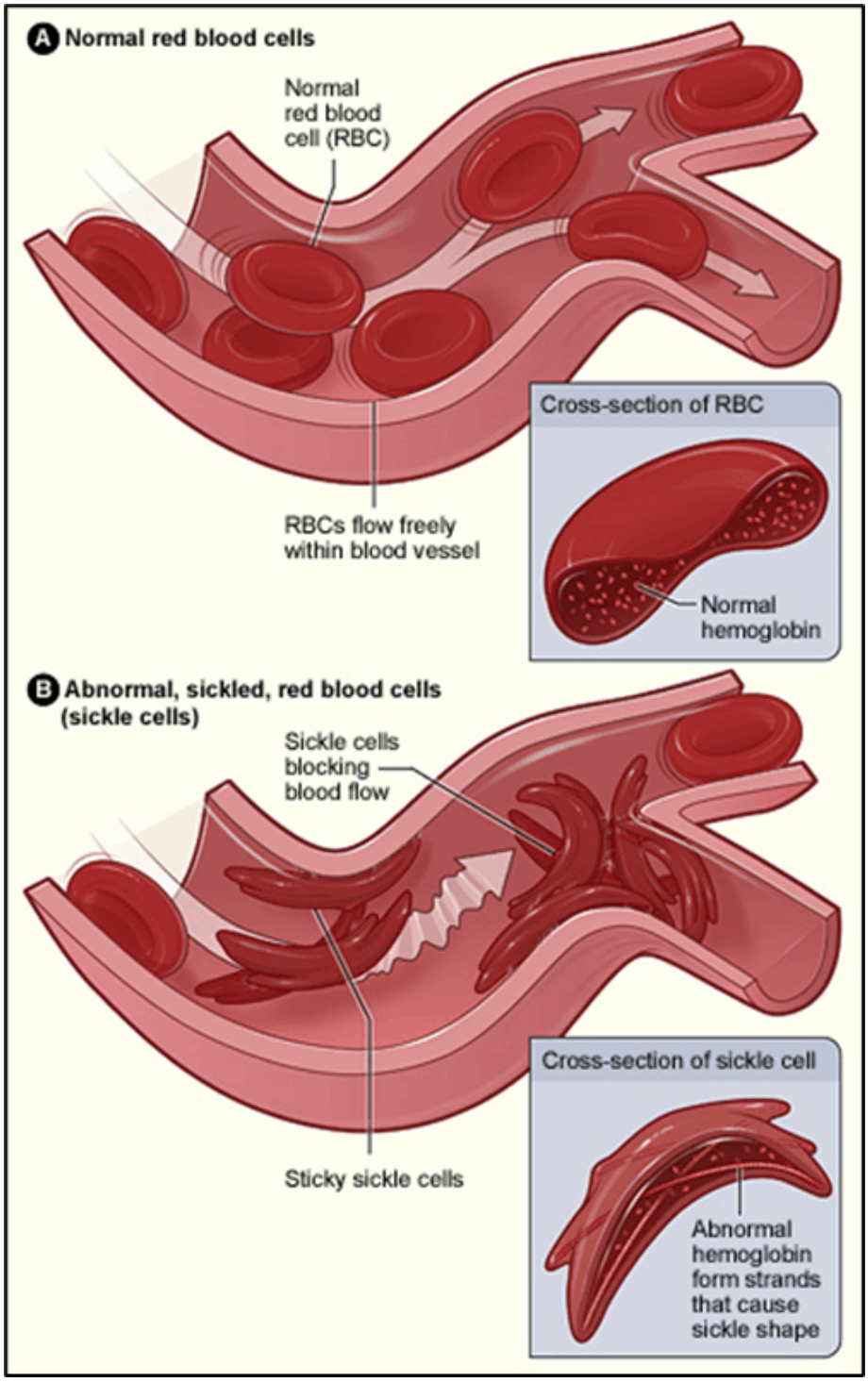
Common Genetic Disorders

Down Syndrome

- It is a genetic disorder caused by the presence of all or part of a third copy of chromosome 21.
- It is also known as trisomy 21.
- It is usually associated with:
  - Physical growth delays.
  - Mild to moderate intellectual disability.
  - Characteristic facial features.

Sickle Cell Disease

- It is a group of blood disorders typically inherited from a person’s parents.
- Sickle cell anaemia (SCA) is the most common type.
- Sickle cell disease results in an abnormality in the oxygen-carrying protein haemoglobin.



Phenylketonuria

- PKU is an inborn error of metabolism.
- It is a genetic disorder inherited from a person's parents.
- It results in decreased metabolism of the amino acid phenylalanine.
- Untreated, PKU can lead to:
  - Intellectual disability
  - Seizures
  - Behavioral problems
  - Mental disorders