Embryology

Embryology

Introduction

Embryology

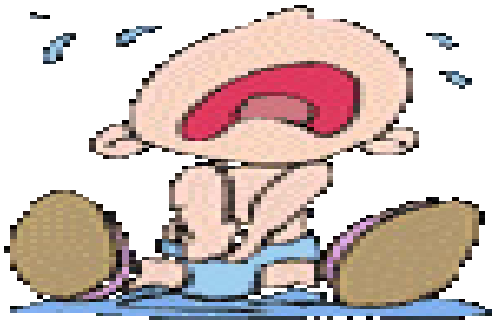
- Definition: the study of the origin and development of an organism

Embryology

- Ontogeny – study of complete life cycle of an organism. It consist of prenatal development and post natal growth
- Prenatal stage- from fertilization to birth.

  -zygote-embryo- fetus (studied in embryology)
- Post natal stage-growth and maturity after birth

  - new born-infant –child- adult



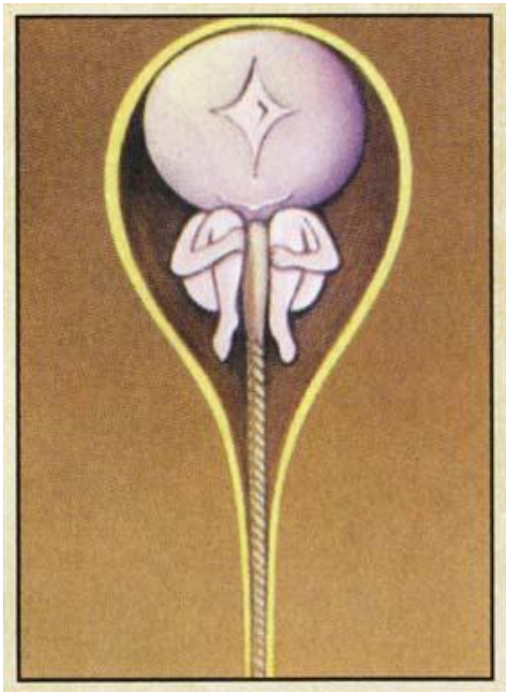
Embryology

Gestation period

- Germinal period- from 1st to 2nd week
- Embryonic period–from 3rd to 8th week
- Foetal period –from 9th week (3rd month) to termination of pregnancy

Embryonic cells

- Totipotent
- Pluripotent
- Omnipotent



Process of development

- **Cell division**
- mitotic division
- meiotic division
- **Growth**
- number of cells
- size of cells
- intercellular substance
- **Differentiation**
- histogenesis

Mitosis

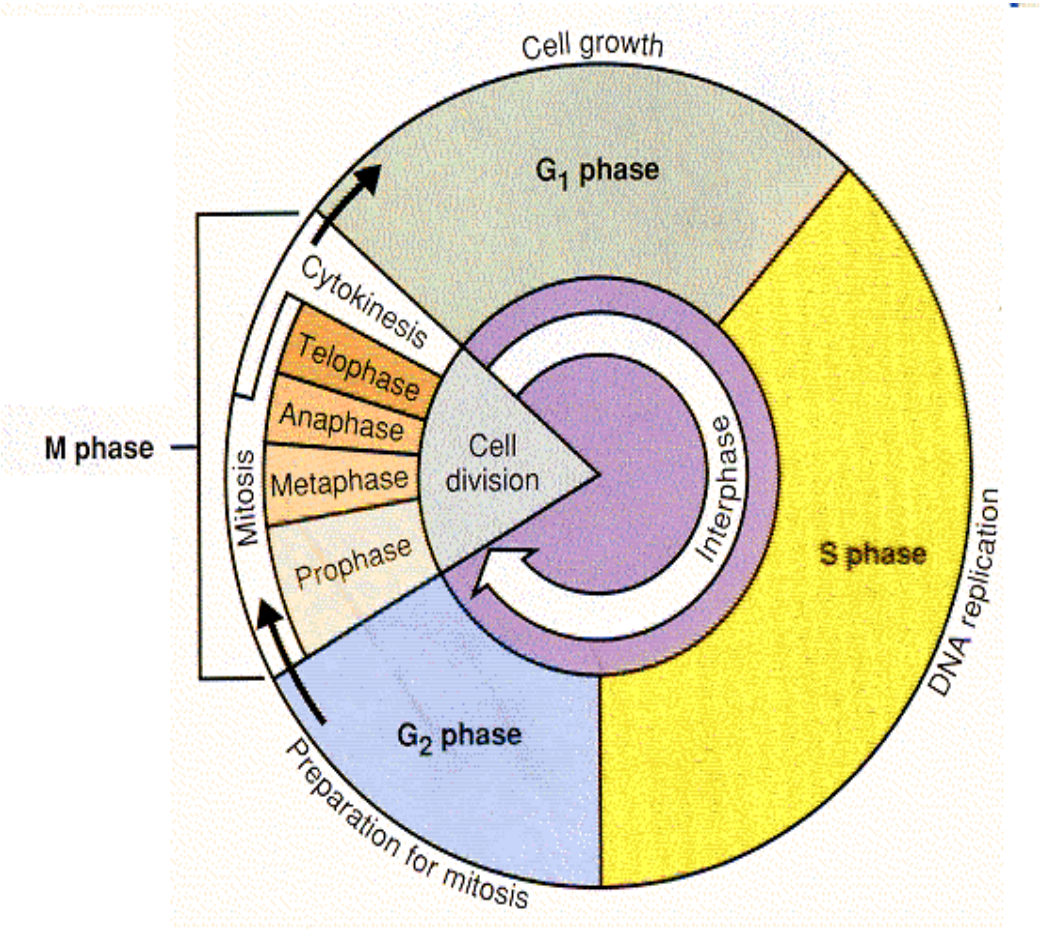
Interphase

Prophase

Meta phase

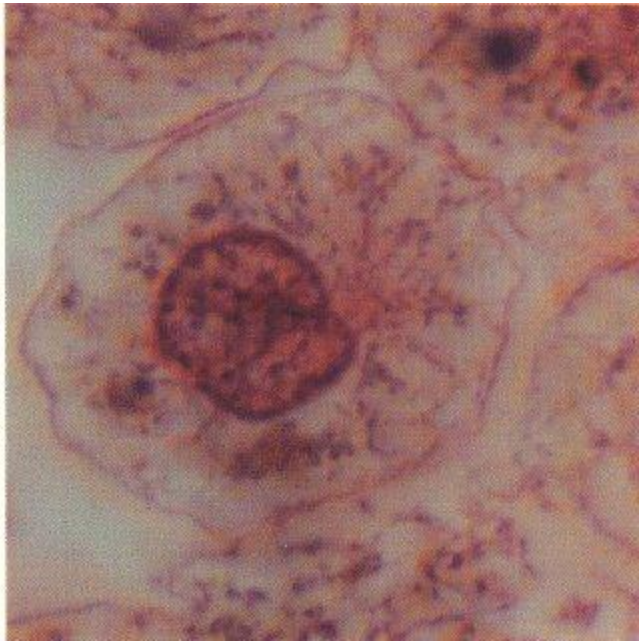
Anaphase

Telophase



Interphase

- Cell Replicates its DNA/Chromosomes in preparation of upcoming division



Animal Cell

Prophase

1. **Chromosomes** Shorten and become visible.
2. **Centrioles** move to opposite sides of the cell
3. Nuclear envelope disappears
4. **Spindle Fibers & Astral Fibers** both together are known as the **Spindle Apparatus** begin to form

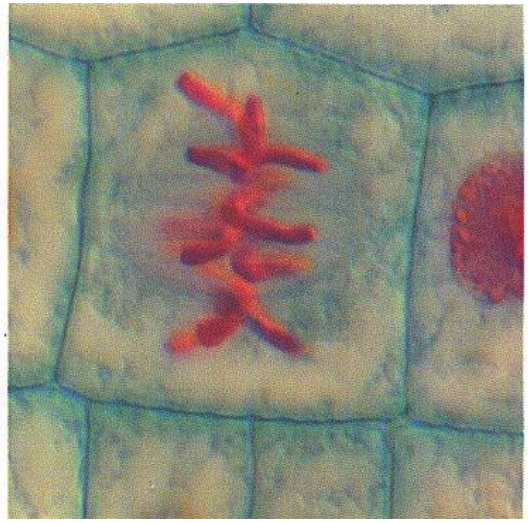
Animal Cell

Plant Cell

Metaphase

- Chromosomes line up along center of cell called the **Metaphase Plate**
- Chromosomes attach to spindle fibers
- Spindle & Astral fibers are now clearly visible

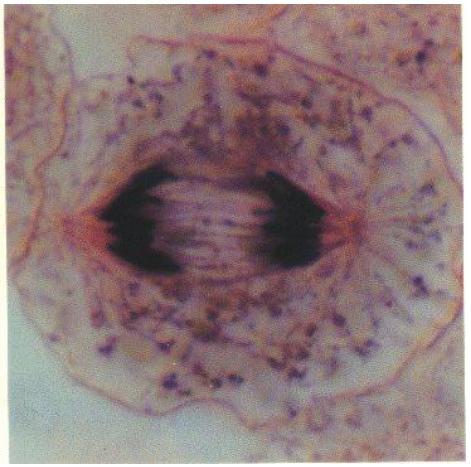
Animal Cell



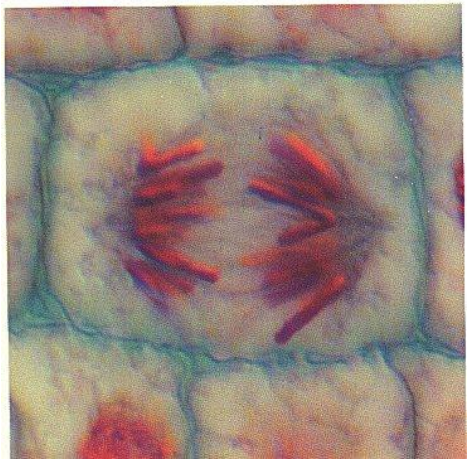
Plant Cell

Anaphase

- **Centromeres** break up separating chromosome copies
- Chromosomes are pulled apart to opposite sides of cell
- Spindle & Astral fibers begin to break down



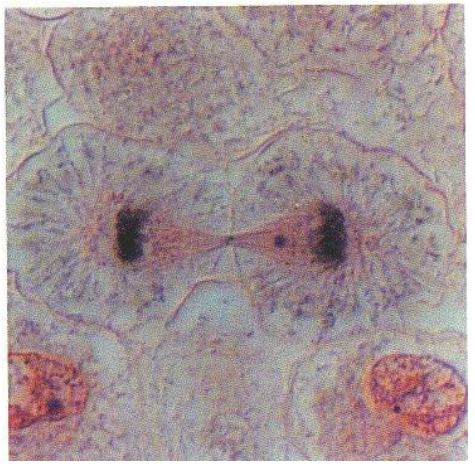
Animal Cell



Plant Cell

Telophase (cytokenesis)

- Nuclear envelope forms around both sets of chromosomes
- DNA uncoils
- Spindle & Astral fibers completely disappear
  - **Cytokenesis** happens with most (but not all) cells
  - Cytoplasm & organelles move (mostly equally) to either side of the cell.Cell Membrane “pinches” to form 2 separate cells



Animal Cell

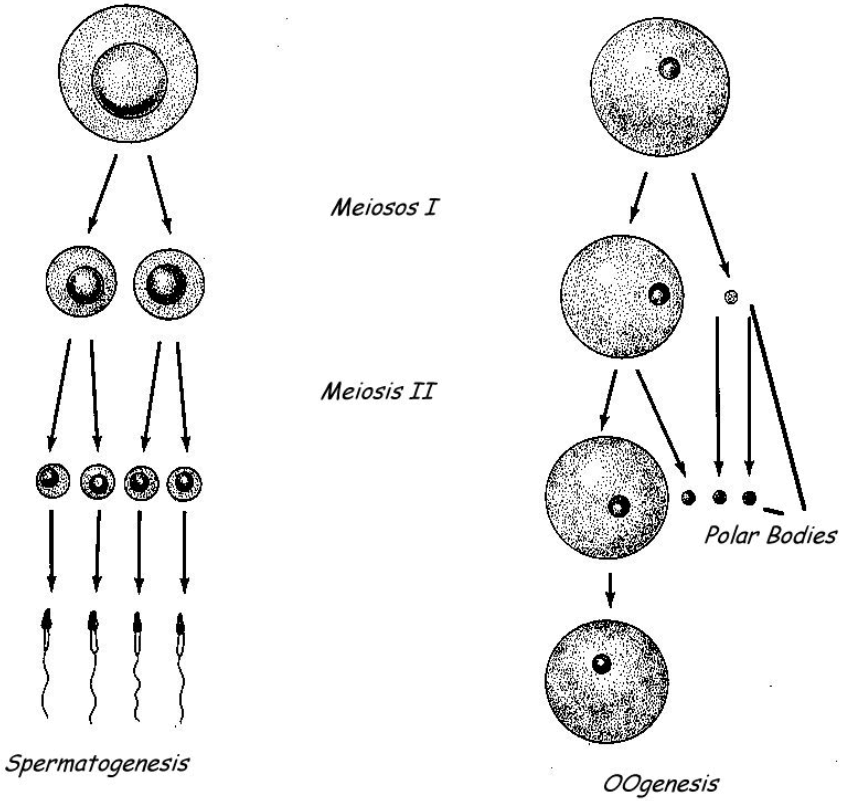
Plant Cell

Meiosis

- Involves 2 cell divisions
- Results in 4 cells with 1/2 the normal genetic information

Vocabulary

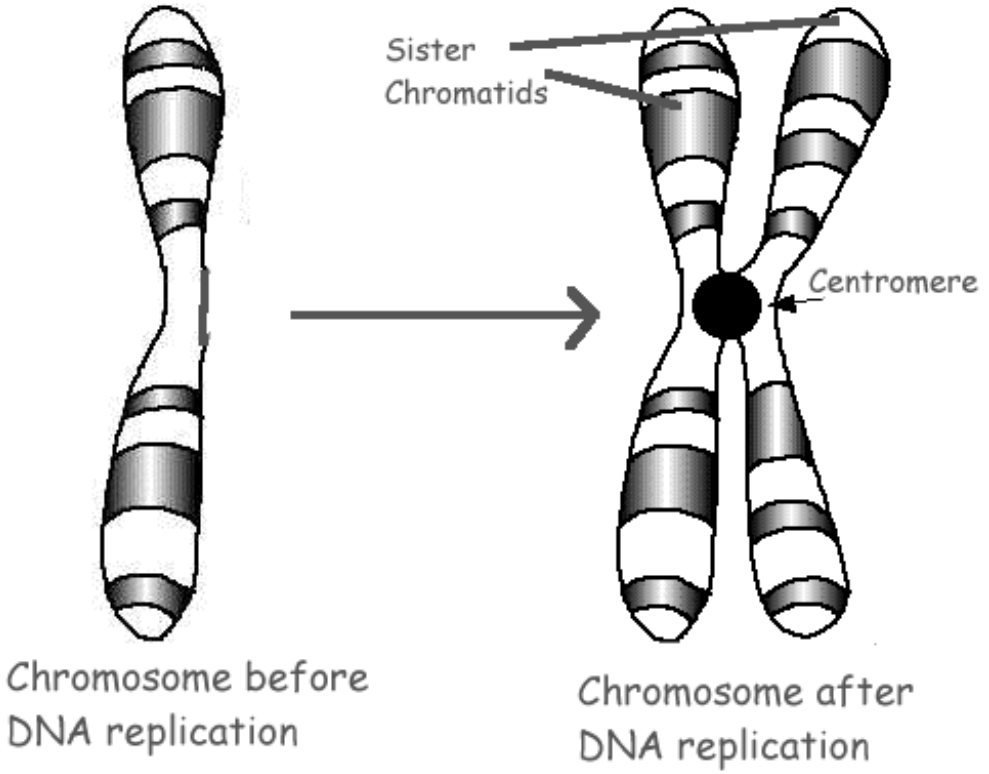
- **Diploid (2N)** - Normal amount of genetic material
- **Haploid (N)** - 1/2 the genetic material.
- Meiosis results in the formation of haploid cells.
- In Humans, these are the **Ova** (egg) and **sperm**.
- Ova are produced in the **ovaries** in females
- Process is called **oogenesis**
- Sperm are produced in the **testes** of males.
- Process is called **spermatogenesis**



Meiosis Phases

- Meiosis occurs in 2 phases; **Meiosis I**, & **Meiosis II.**

- **Meiosis I.**
  - Prior to division, amount of DNA doubles



Meiosis I.

Interphase I

Prophase I

Leptotene- chromatids appears

Zygotene -pairing/synapsis

Pachytene-crossing over

Diplotene -exchange genetic material

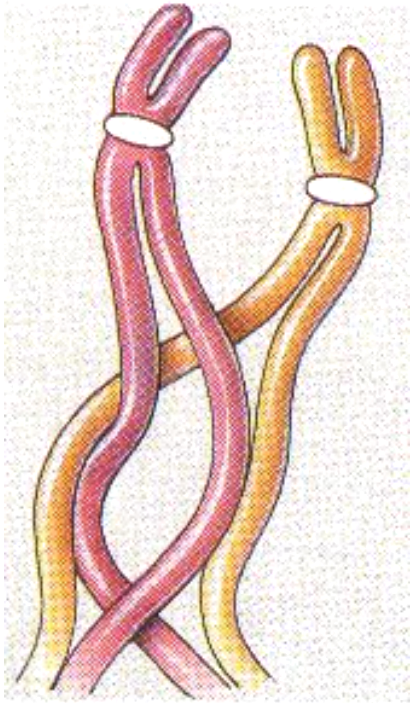
Meta phase I-

Anaphase I- chromosome reduction

Telophase I

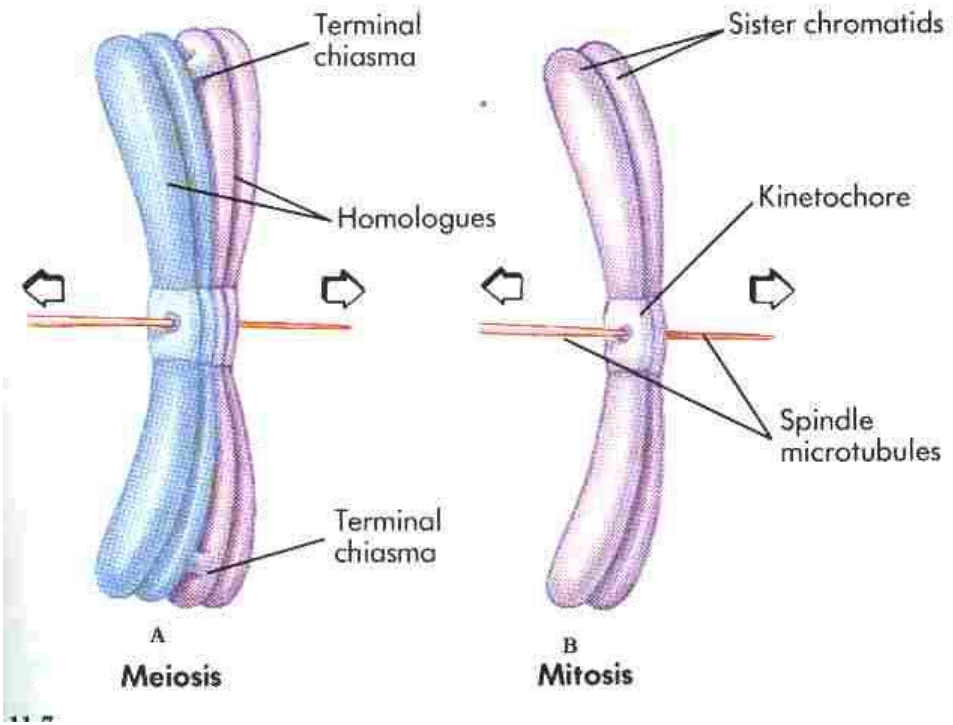
Crossing Over

- Areas of homologous chromosomes connect at areas called **chiasmata**



Chromosome reduction

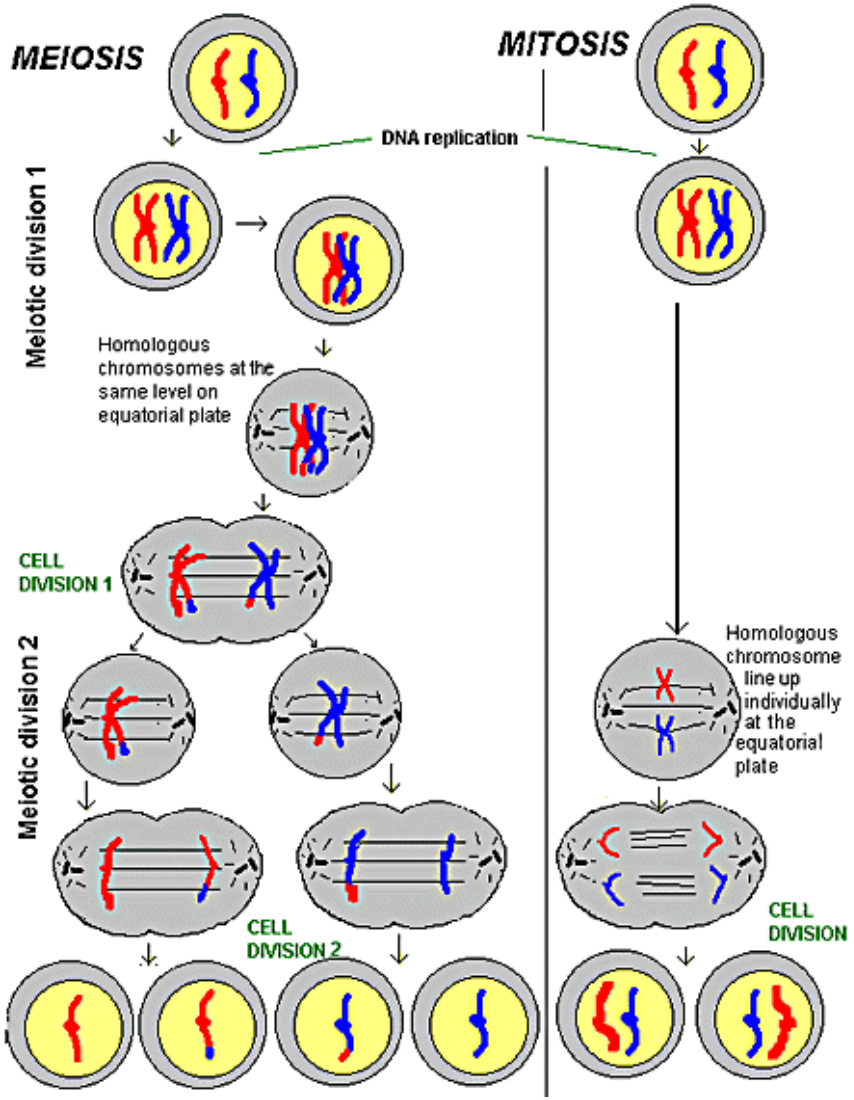
- During anaphase 1, each homologous chromosome is pulled to opposite sides of the cell. Unlike mitosis, **THE CENTROMERES DO NOT BREAK**.



Meiosis II.

- Same as mitotic division

Comparison of Mitosis & Meiosis




Thanks