

Developmental Biology

Objective: Describe the impact that the study of developmental biology has had on human health

Studying developmental biology has furthered the understanding of gametogenesis and fertilisation that has led to treatments for infertility that has gradually risen to become a key health issue. Developmental biology has also furthered the understanding of prenatal development that has led to a greater understanding of congenital defects and improved the detection, treatment and prevention of such conditions. Furthermore, developmental biology's insights into the process of growth, replacement and repair promises a great deal for regenerative medicine such as cell therapies, organ replacements etc.

Objective: Describe the steps in meiosis

Interphase: Cell growth and replication of DNA in preparation for cellular division in meiosis.
Prophase I: Disintegration of the nuclear envelope. Chromosomes condense. Mitotic spindle extends.

Metaphase I: Homologous pairs pair up along the equatorial plane. Crossing over occurs. Chromosomes attach at the centromere to the mitotic spindle.

Anaphase I: Homologous pairs pulled apart to opposite sides by the mitotic spindle.

Telophase I & Cytokinesis: Nuclear envelope reforms. Spindle breaks down. Cells divide cytoplasm to form two haploid daughter cells with replicated DNA.

Prophase II: Mitotic spindle forms. Disintegration of the nuclear envelope. Chromosomes condense.

Metaphase II: Chromosomes line up along the equatorial plane and attach at the centromere to the mitotic spindle.

Anaphase II: Sister chromatids separated and pulled to opposite poles.

Telophase II & Cytokinesis: Nuclear envelope reforms. Meiotic spindle breaks down. Cells contents divide.

Objective: Describe the differences in meiosis in forming eggs and sperm

Eggs take much longer to mature

Sperm is formed from onset of puberty and continuously from that point onwards. Eggs are first formed from foetal development and no more from that point onwards.

A single spermatogonium forms four mature spermatid. A single oocyte forms a single ovum and three polar bodies that a non-fertile/viable.

Identify the key steps in spermatogenesis

Spermatogonium undergoes mitosis to form primary spermatocytes.

Primary spermatocytes undergo meiosis I to form secondary spermatocytes.

Secondary spermatocytes undergo meiosis II to form round spermatid.

Round spermatid develop; losing cytoplasm, growing a large flagella and an acrosome to form a spermatozoa.