

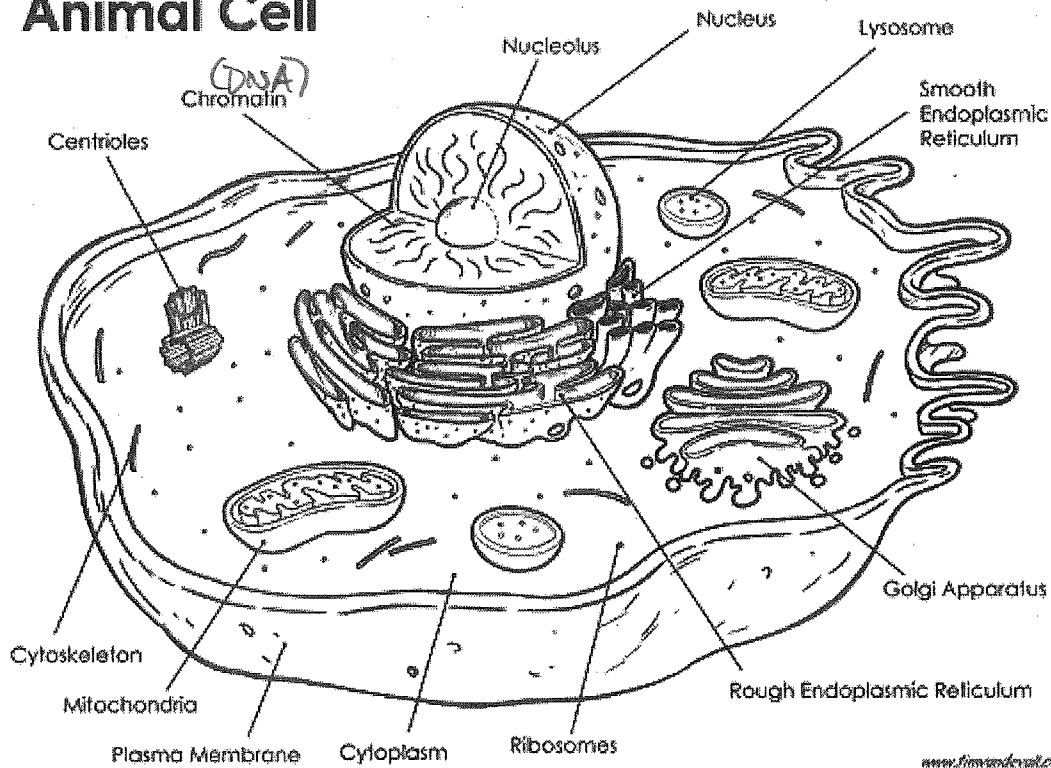
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Chapter 4. THE PERPETUATION OF LIFE

study the diagrams in your text book

-The CELL is the basic (smallest) unit of life

-Cell Structures and Organelles:

Animal Cell



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 Animal Cell Diagram - Copyright © Dutch Renaissance Press 1215

Nucleus	contains, protects genetic info. (DNA)	Mitochondria	Produces ENERGY through "cellular respiration"
Endoplasmic Reticulum	Protein synthesis Transports material in cell	Golgi Apparatus	Storage and transport outside the cell
Ribosome	Protein synthesis	Lysosome	-Digest nutrients -Decompose some cell material
Cytoplasm	Ideal environment for cell chemistry	Cell Membrane	-Barrier for protection -Allows nutrients IN and waste OUT.

-DNA is a chain of base pairs (of nucleotides).

- DNA bases are A (adenine), C (cytosine), G (guanine), and T (Thymine). They are always paired as A-T and G-C
- The chain is twisted to have a double helix structure.
- DNA molecules are extremely long and have to be packed as chromosomes when the cell is dividing.
- Human somatic or body cells have 46 chromosomes (each with a duplicate sister chromatid, connected at the centromere), that's 23 from the Female parent and 23 from the male parent. We call these diploid or 2n.

-Cellular Specialization (tissue → organ → system)

- **Tissues:** epithelial, connective, muscle, nerve
- **Organs** are made of 2 or more tissue types (ex: the stomach uses all 4 types)
- A **system** is a group of organs and tissues with a common function. (Ex: digestive system from the mouth to the esophagus to the stomach etc...)

-The Cell Cycle is separated into interphase (most of the cell's life and when normal cell metabolism occurs) and the 4 stages of cell division...

-Cell Division (for Mitosis, Meiosis I or Meiosis II)

- Prophase: DNA is packaged as chromosomes and the nuclear membrane disappears.
- Metaphase: Chromosomes (Mitosis) or homologous pairs of chromosomes (Mitosis I) align at the center of the cell.
- Anaphase: Chromosomes or Homologous pairs are pulled apart by spindle fibres.
- Telophase: New nuclear membranes are formed and cytokinesis occurs (movement of the cytoplasm into 2 new cells)

-Meiosis produces haploid (n) sex cells. It occurs in the testicles (males) and in the ovaries (females). Two cell divisions produce 4 haploid gametes from 1 diploid cell.

- Male gametes are called: spermatozoa
- Female gametes are called: ova

-Stages of Human Development

Before Birth Zygote → embryo → Fetus →

After Birth Baby → early childhood → childhood → adolescence → adulthood → old age

-Puberty Hormones

- The pituitary gland of the brain releases FSH and LH
 - Primary Sexual Characteristics (Male): Genital organs mature

- Primary Sexual Characteristics (Female): Genital organs mature, menstrual cycle begins
- The Testicles produce testosterone (male) and ovaries produce estrogen and progesterone (female)
 - ~~Primary~~ ^{secondary} Sexual Characteristics (Male): Psych. changes, ↑ skeletal muscle, hair in new areas
 - ~~Primary~~ ^{secondary} Sexual Characteristics (Female): Psych changes, breasts dev, pelvis widens, Fatty tissue on hips, hair in new areas

-Female Reproductive Cycle

- Ovarian Cycle
 - a. In the ovaries, inside an ovarian follicle, a diploid oocyte undergoes meiosis I.

**Hormone: Triggered by FSH, then ovaries produce estrogen which stimulate the pituitary to produce more FSH and LH
 - b. In "**Ovulation**": the haploid ovum is expelled into the fallopian tube.

**Hormones: triggered by ↑ in LH. Accompanied by a surge in LH and FSH.
 - c. Ovarian Follicle turns into the **corpus luteum**

**Hormones: The corpus luteum secretes progesterone (the "STOP signal which inhibits FSH and LH at the pituitary)
 - d. As the corpus luteum disintegrates and progesterone decreases the pituitary can be produce FSH and LH again.
- Menstrual cycle
 - a. Bleeding occurs do to the expulsion of the endometrium and the unfertilized ovum.

**Hormones: Caused by the ↓ in progesterone.
 - b. Endometrium Thickens

**Hormones: Production of estrogen by a new ovarian follicle.
 - c. Endometrium continue to Thicken.

**Hormones: Secretion of progesterone by the corpus luteum.

-Male Reproductive Cycle:

- Spermatogenesis occurs in the Seminiferous tubules of the testicle
- Diploid spermatogonium undergo meiosis to produce haploid spermatozoa.
- Sperm then travel to the
 - Epididmis (in the testicles)
 - Vas Deferens
 - Ampulla of the Vas Deferens
 - Seminal Vesicle
 - Urethra
 - Prostate gland
 - Bulbourethral gland

