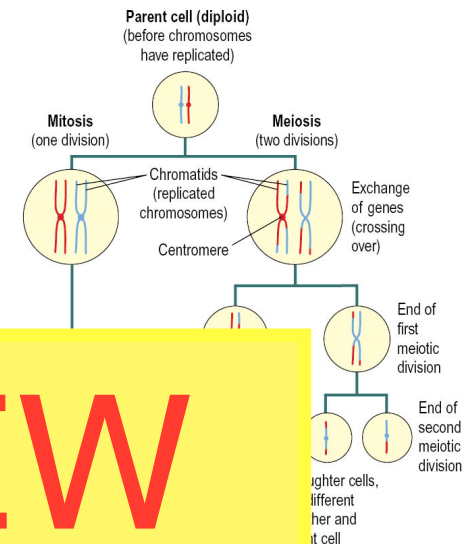


LECTURE 13:What is the reproductive system?

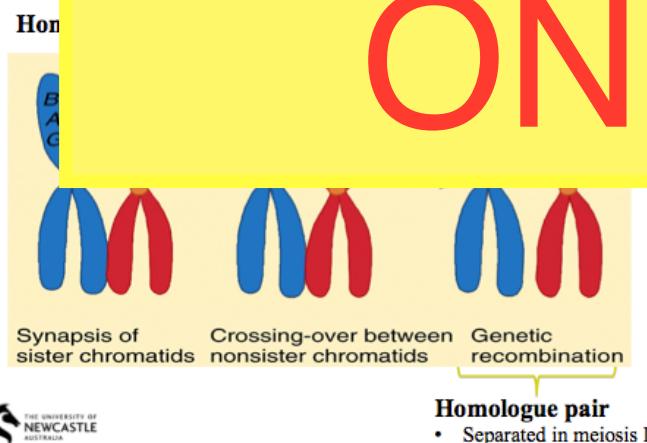
- Gonads= primary sex organs. These include ovaries and testes, produce gametes and secrete steroids.
- Accessory reproductive organs include:
 - Ducts- gamete transport
 - Glands- secrete fluids
 - External genitalia
 - Organs/tissue involved in embryo nurture (uterus)
 - Organs/tissue involved in newborn nurture (breast)

Define recombination and understand its relevance to meiosisWhy do we have sex?

- Meiotic recombination:
 - The process of 'shuffling' chromosomes during the production of haploid cells.
 - Enhances genetic diversity.
 - Gametes are genetically different from the parent cell.
 - Meiosis produces four genetically different daughter cells.



PREVIEW ONLY

Crossover and

Homologue pair
• Separated in meiosis I

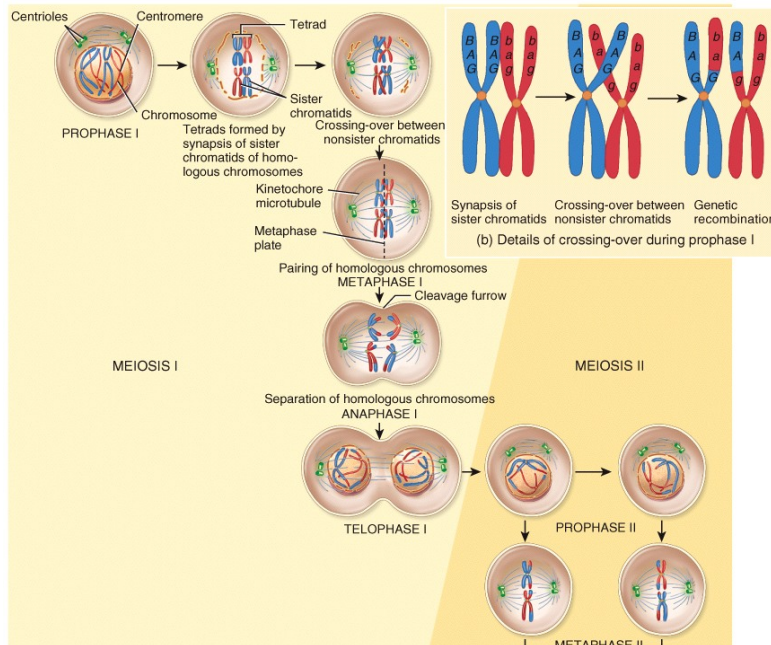
- **Understand the processes of mitosis and meiosis**

Mitosis and Meiosis:

	MITOSIS	MEIOSIS
Number of divisions	One, consisting of prophase, metaphase, anaphase, and telophase.	Two, each consisting of prophase, metaphase, anaphase, and telophase. DNA replication does not occur between the two nuclear divisions.
Synapsis of homologous chromosomes	Does not occur.	Occurs during meiosis I; tetrads formed, allowing crossovers.
Daughter cell number and genetic composition	Two. Each diploid ($2n$) cell is identical to the mother cell.	Four. Each haploid (n) cell contains half as many chromosomes as the mother cell and is genetically different from the mother cell.
Roles in the body	For development of multicellular adult from zygote. Produces cells for growth and tissue repair. Ensures constancy of genetic makeup of all body cells.	Produces cells for reproduction (gametes). Introduces genetic variability in the gametes and reduces chromosomal number by half so that when fertilization occurs, the normal diploid chromosomal number is restored (in humans, $2n = 46$).

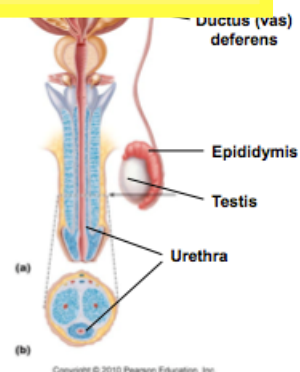
Function of Meiosis:

- In multicellular organisms it makes sexual reproduction possible by producing haploid cells. It provides for constancy of chromosome number from generation to generation.
- Recombination of existing genes in germ line cells generates diversity (species diversity).



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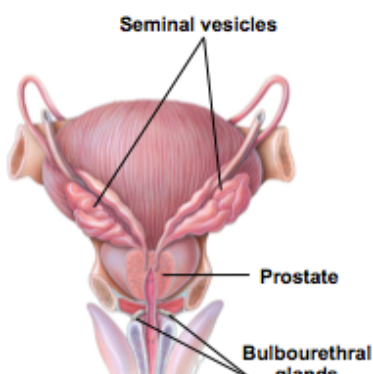
- **Epididymis** is a biconoid duct-20 d transit. This is the site of sperm maturation-process by which sperm acquire mobility and ability to fertilise an ovum. It can also store sperm for several months. It is lined with pseudostratified columnar epithelium and encircled by layers of smooth muscle.
- **Vas deferens** (ductus deferens): carries sperm from the epididymis to the ejaculatory duct. Consists of pseudostratified columnar epithelium and lamina propria (areolar connective tissue).
- **Urethra**: urinary and reproductive systems
- **Penis**: contains urethra and is the passageway for ejaculation of semen and excretion of urine



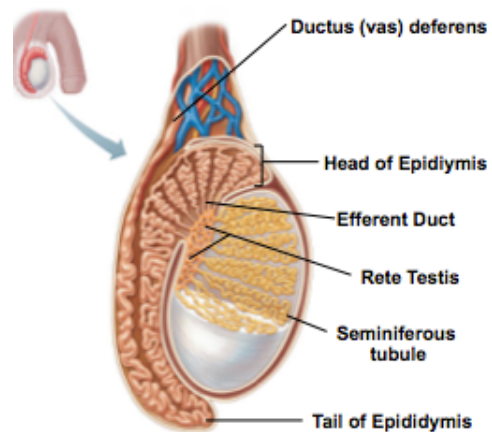
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Accessory Glands:

- Accessory sex glands secrete most of the liquid portion of semen.
- Seminal vesicles produce 70% semen volume. This includes: fructose, ascorbic acid, vesiculase (coagulation), prostaglandins



- Prostate produces 30% semen volume. This includes: citrate, enzymes, PSA.
- Bulbourethral glands produces thick clear mucous. This aids lubrication and neutralises residual urine in urethra.

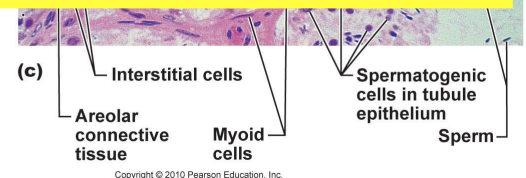


Semen composition:

- Ejaculate (2-5ml) contains:
 - Spermatozoa
 - Seminal fluid (accessory glands)
 - Clotting factors (coagulation)
 - Enzymes (subsequent liquefaction of clotted semen)
- Male infertility problems generally caused by:
 - Too few sperm

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- This process of **sperm production is spermatogenesis**.
- There are 2 types of cells in the seminiferous tubules:
 - Spermatogenic cells (sperm forming cells)
 - Sustentacular cells (several functions supporting spermatogenesis)



- **Describe spermatogenesis and sperm structure**

Spermatogenesis:

spermatogonium (2n) → primary spermatocyte (2n) → secondary spermatocyte meiosis (n) → spermatid meiosis (n) → sperm cell

1. Begins with **spermatogonia**, types of stem cells, contains the diploid number (2n) of chromosomes (46).
 - When the stem cells undergo mitosis, some spermatogonia remain near the basement membrane of the seminiferous tubule. These are in an undifferentiated state and serve as a reservoir of cells for future cell division and sperm production.
 - Rest of the spermatogonia:
 - Lose contact with basement membrane
 - Go through tight junctions of blood-testes barrier
 - Undergo developmental changes
 - And differentiate into **primary spermatocytes**. Like spermatogonia, primary spermatocytes are diploid (2n)- i.e. 46 chromosomes.