

BIOL30001 Course Summary Notes

Table of Contents:

Lectures 1-8,11	Page 2
Lectures 9,10	Page 21
Lectures 12-17	Page 25
Lectures 18,19	Page 36
Lectures 20-26	Page 38
Lectures 27-29	Page 47
Lectures 30-34	Page 52

Lectures 1-8,11

Reproductive Strategies

Sexual

- Two sexes: male and female
- Protogyny (**female to male**) – if no dominant male, then most dominant female has ovaries removed, develops testes and becomes male
- Protandry (**male to female**) – male only becomes female after having grown to a certain size (eg: barramundi)

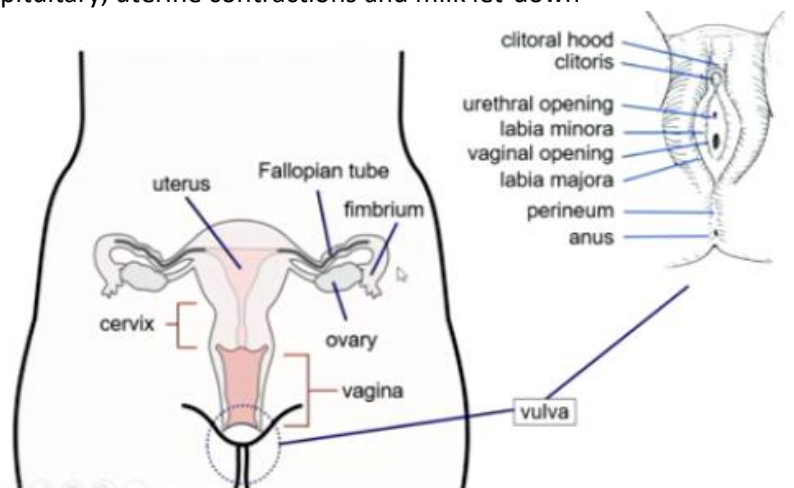
Asexual (clonal: no exchange of genetic material)

- Budding – produce buds which drops off as clonal copy
- Parthenogenesis – offspring develops from unfertilised eggs (NB: eggs can also be fertilised (sexual reproduction))
- Pros: faster
- Cons: susceptible to disease/predators (due to reduce evolution by natural selection)

Female Reproductive System

Anatomy

- Ovaries
 - Thick epithelium surface through which ovum is expelled
 - Cortex – outer part, where germ cells/follicles/corpus albicans sit
 - Medulla – fibrous connective-tissue stroma
 - Contains blood vessels and nerves – control of hormones and nutrients
 - Ovoid shape
 - Important hormones (5 main classes):
 - NB: precursor is always cholesterol (cannot be synthesised so taken in through diet)
 - Rate limiting step is taking cholesterol from blood (through to be converted to pregnenolone) via *cholesterol side chain cleavage*
 - Prostaglandins (PG)
 - Several families (E, F, H, I)
 - Arachidonic acid is pre-cursor
 - Made from PGH to PGE or PGF
 - PGE – saves CL
 - PGF_{2α} – causes CL demise
 - Other hormones
 - Relaxin – relaxes cervix at full term (birth)
 - Oxytocin – from posterior pituitary, uterine contractions and milk let-down
 - Inhibin – suppresses FSH
- Fallopian tubes (oviduct)
 - Supercoiled structure – 25cm in total length
 - Width of little finger
 - Secretory epithelium
 - Egg squeezed and propelled along by:
 - Muscular wall (influenced by oestrogen and progesterone)
 - Cilia



- Parts:
 - **Fimbrium** – not physically connected to ovaries, but ‘moves’ to collect egg
 - **Infundibulum**
 - **Ampula** – location of fertilisation
 - **Isthimus** (bridge)
- Uterus
 - Uterine body – where oviducts join uterus
 - Uterine horns – required to adequately place foetus(es) within uterine tract, size depends on number of embryos (litter)
 - Layers:
 - Myometrium (deepest layer)
 - 2 layers of muscle – transverse and longitudinal; cause uterine contraction during birthing
 - Endometrium
 - Secretory glands in stroma
 - Shed off in menses
 - Luminal epithelium
 - Columnar epithelium cells
 - Secretory
- Cervix
 - Tight rings of connective tissue
 - Gatekeeper – keeps ‘in’ and ‘out’ things (i.e. 99% of sperm does not progress through)
 - Epithelium secretes mucous
- Vagina
 - Muscular walls
 - Squamous epithelium cells (keratinised)
- External genitalia
 - Morphology varies widely between humans

Folliculogenesis

- Primordial follicle – sit dormant in ovaries until 20-50 recruited every month (recruitment signal unknown)
 - Oocyte surrounded by one cell thick basement membrane
 - Biggest cell in body (diameter $\approx 110\mu\text{m}$)
 - Meiosis:
 - Arrested in meiosis I – meiosis II only completed upon fertilisation
 - Meiotic divisions go from 1 \rightarrow 1 (not 1 \rightarrow 4 like sperm in meiosis)
 - Remnants go into polar bodies:
 - Meiosis I make a diploid polar body
 - Meiosis II makes a haploid polar body
 - Growing oocyte acquires raw material, mitochondria, stable RNA, peptides and proteins
 - Required to sustain the embryo after fertilisation (species-dependent time period)
 - **Gonadotrophin independent** (don't have the receptors) – do have to be acted on by other factors
 - All laid down during foetal development

