REPRODUCTION (Ch. 14)

1. INTRODUCTION

functions - produce offsprings
- increase or maintain population

asexual - mitosis, reproductive organs not required
- rapid but no variation

sexual - meiosis, gonads produce gametes that combine
- increase genetic variation
- inefficient (time, energy, cells)

2. MITOSIS

mitosis - 'normal' cell division
- occurs in cells throughout body
- produces 2 identical daughter cells

Interphase - normal activity (while not dividing)
- chromosomes not visible (uncoiled)

Prophase - nucleus begins to disappear
- chromosomes now visible (each 2-stranded)

Metaphase - individual chromosomes line up at equator

Anaphase - each chromosome divides between strands
- 1-stranded chromosomes move to opposite sides

Telophase
- 2 nuclei form (around different sets chromosomes)

Cytokinesis - cell membrane divides thru cytoplasm
- results in 2 cells (each with 46 chromosomes)

Interphase - return to normal cell activity
- each chromosome duplicates 2nd strand

3. ASEXUAL REPRODUCTION

fission - mitosis produces 2 organisms

budding - small bud develops from parent

gemmule - internal bud to survive drought

fragmentation - regenerate if injured

4. MEIOSIS

meiosis - only in gonads to produce sperm / ova
- total 2 divisions results in 4 gametes
- no. of chromosomes reduced in half (23)

meiosis I - reductional division
- divides **pairs** of homologous chromosomes
- reduces no. of chromosomes from 46 to 23

meiosis II - like mitosis (but with only 23 chromosomes)
- separates strands within each chromosome

5. SEXUAL REPRODUCTION

dioecious - 'two-houses', males separate from females
- different gonads in separate organisms

monecious - 'one-house' or 'bisexual'
- both gonads in same organism

spermatozoa - small, numerous, motile

ovum - larger, fewer, non-motile, yolk

cloaca - single external opening
- releases gametes, feces, & urine

environmental sex determination (ESD)
- no sex chromosome (Genetic SD)
- sex depend on chem, sun, or temperature
- adjusts sex ratio to optimize survival of population

6. SPERMATOGENESIS (human)

testis - pair in scrotum (1.5°C cooler)
- produces sperm & testosterone

penis - copulatory organ
- urogenital duct (also releases urine)
- corpus tissue (blood vessels, no baculum)

meiosis - each produces 4 sperms total
- 300 million per day, 100 million per ml

semen - fluid transport sperm

sperm - head, midpiece, flagellum

7. OÖGENESIS (human)

ovary - pair within pelvis, produces ova
- also estrogen & progesterone

uterus - supports developing embryo
- strongest muscle among humans
- vagina (birth canal, also for menstruation)

clitoris - nerve & erectile tissue similar to tip of penis

meiosis
- females born with 2 million ova (only 400 develop)
- each produces 1 ovum & 3 polar bodies

ovum - largest cell (esp. yolk)

8. FERTILIZATION

fertilization - restore no. of chromosomes
- combine genes from both parents

external - egg fertilized outside body
- low probability, needs abundant gametes
- panmixia (cast gametes into ocean current)

internal - deliver sperm into female
- increases probability of fertilization

parthenogenesis - ovum develops without sperm

hermaphrodite - mutual exchange or serial monecious

artificial insemination - versus natural service

9. EMBRYONIC DEVELOPMENT (frog)

zygote - single cell, 2 separate nuclei

embryo - fuse nuclei (combine chromosomes)

cleavage - rapid cell division but no growth

morula - solid ball of cells

blastula - 1 layer of cells around cavity

gastrulation - pushes inward from outside

gastrula - archenteron (new cavity)
- blastopore - opening, develops into mouth or anus

differentiation - specialization of cells

germ layers - begin to develop tissues
- ectoderm - skin & nervous system
- mesoderm - all others systems
- endoderm - digestive & respiratory systems

organogenesis - develop organs

10. VERTEBRATE DEVELOPMENT

fish & amphibians - gelatinous eggs, small yolk

reptiles & birds - dry eggshell, more yolk & albumin

mammals - pregnancy (develop within uterus)
- nutrition thru umbilical & placenta
- milk from mammary glands