BIOL-BLE: YOUR BIOL1020 BIBLE (PART THREE)

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BASED ON SEMESTER 1, 2016 CONTENT

NOTES FROM MODULES IN AND ALL FIGURES FROM PRINCIPLES OF BIOLOGY TEXTBOOK

Welcome to your guide to make it through BIOL1020! There is a lot of content, but hopefully the biol-ble will help you to manage and understand it all.

Included in Part Three are all modules covered in Weeks 8-10 of Semester 1, 2016 in preparation for Mini Test 3. These are modules 35-38, 41, 42, 46 and 79. Parts One, Two and Four are also available for purchase on StudentVIP.

Due to the interactive nature of the Principles of Biology textbook, some figures may be referred to that are not found here, and that is likely as they are interactives exclusively available by purchase of the online textbook.

Please note that this should in no way serve as a replacement for a completing required readings, but are an extensive additional resource and great for exam revision.

Many abbreviations as well as acronyms have been used as shorthand within modules and for this reason a comprehensive table containing all of them and their relevant meanings in alphabetical order has been provided at the end of the biol-ble.

Good luck in your studies!

Module 35 Inheritance in the Sexual Life Cycle

- **Life cycle**, stages an organism passes through from one generation to the next
- Chromo. passed on via **sexual** or **asexual** reproduction
- Most EK cells **diploid (2n)** where **n** is # diff. chromo. in cell - 2n means cell contains 2 copies of each diff. chromo.
- 2 copies are called **homologous chromosomes** and have same genes at same loci
- Homo. chromo. may have diff. version of genes, called **alleles**
- 2n organisms:
  - egg and sperm cells are **haploid (1n)**, one copy each chromo.
  - Cells called **gametes**
  - Prod. by type of CD called **meiosis**, like M but prod. cells with n chromo. from 2n cells
- Asexual reprod. incl.:
  - binary fission (B and amoeba)
  - Propagation of plants and some animals by **clonal growth**
  - Cases where eggs of some plants and animals made my M, creating offspring genetically identical to mother
- Advantages of sexual reprod.:
  - Allows genes from parents to mix via recombination
  - Increases genetic variation
  - Possibly increases genetic variation of phenotypes
  - Higher chance some offspring have traits for survival so can reprod.
- Sexual reprod.:
  - Haploid sperm + haploid egg = 2n **zygote**
  - 2 key events, meiosis and **fertilisation**
  - Prod. genetically unique individuals
- **Germ cells** (eggs and sperm) while other cells are **somatic cells**
- **Karyotype**, pairs of chromo. arranged from longest to shortest (Fig 1)
- Two types of chromo.:
  - **Sex chromo.**:
    - Chromo. that show variation between sexes
    - Most mammals and some insects have X and Y sex chromo.
    - Most males XY, females XX
    - Some animals incl. birds have W and Z w/ male birds ZZ and females WZ
  - **Autosomes**:
    - All other chromo. that are not sex chromo.
    - Diploids 2 copies each autosome

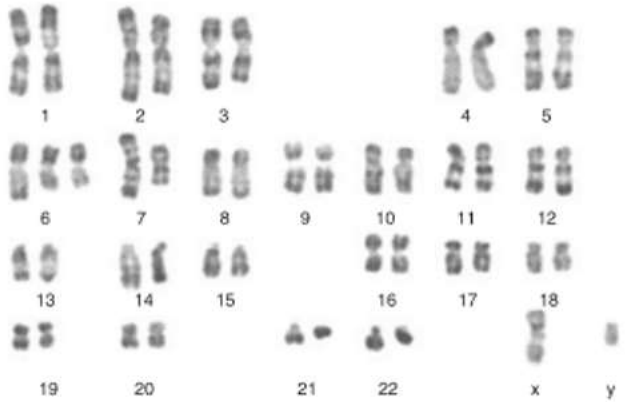

FIGURE 1 A karyotype of a human male. Humans have 46 chromosomes. There are 44 autosomes and two sex chromosomes. Human karyotyping is sometimes done to detect the presence of chromosomal abnormalities associated with medical problems. For example, the karyotype above indicates a chromosomal abnormality because there are three copies of chromosome 6.

Species	# (2n)
Dog	78
Domestic cat	38
Domestic sheep	54
Elephants	56
Fruit fly	8
Garden snail	54
Guinea pig	64
Horse	64
Human	46
Kingfisher	132
Laboratory rat	42
Rabbit	44
Silkworm	56

TABLE 1 Chromosome numbers in some animal species. Plant chromosome numbers are in a similar range; corn has 20 chromosomes, and the tobacco plant has 48 chromosomes.

- Humans, 46 chromo. w/ 44 autosomes and 2 sex chromo.
- Complexity is not proportional to chromo. # (Table 1)
- Fig 3
- Animal and plant life cycle similarities:
    - Use meiosis to prod. haploid cells:
        - Animals, haploid gametes directly prod. by mei.
        - Plants, mei. prod. haploid spores first
    - Use fertilisation to fuse male and female haploid gametes to make diploid zygote
    - Use M to prod. multicellular adult from single-celled zygote
- Animals only haploid cells are sperm and egg which are single-celled so no multicellular haploid struc.
- **Alternation of generations**:
    - plant life cycle which has both n and 2n multicellular stages
    - e.g. fern (Fig 4):
        1. Adult plant is **sporophyte**
        2. Underside of leaves, struc. called **sporangia** that releases n spores
        3. Spores diff. to gametes as prod. a multicellular organism w/out forming zygote
        4. Spores dispersed
        5. Grow into small, heart-shaped n plant called **gametophyte**
        6. Has male and female sex organs called **antheridia** and **archegonia** respectively (in plants)
        7. Anth. release motile sperm which swim to an archegonium to fertilise egg
        8. Male and female gametes fuse to form 2n zygote
        9. Grows out of gametophyte to form sporophyte
    - Flowering plants similar (Fig 5):
        1. w/in **anthers** (male) and **ovaries** (female), struc. called **microsporangia** (male) and **megasporangia** (female)
        2. Prod. n **microspores** and **megaspores** by mei. which are single-celled
        3. M to form male germ cells **(pollen)** and female germ cells **(ovules)**
        4. Pollen is **microgametophyte** and ovule is **megagametophyte**
        5. Gametophyte adults multicellular

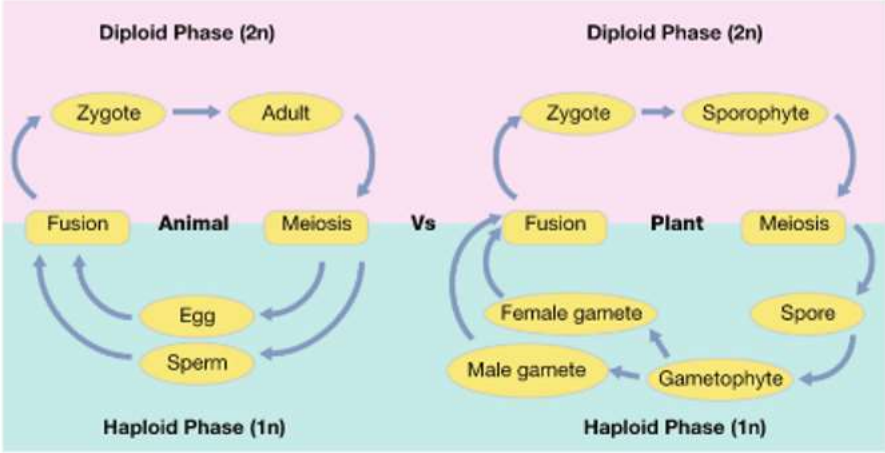

FIGURE 3 The life cycles of animals and plants. The main difference between the life cycles of animals and plants is that in complex animals, shown here on the left, the animal itself is always diploid. In plants, shown on the right, there are two separate stages (gametophyte and sporophyte), and the gametes are not the only haploid cells.

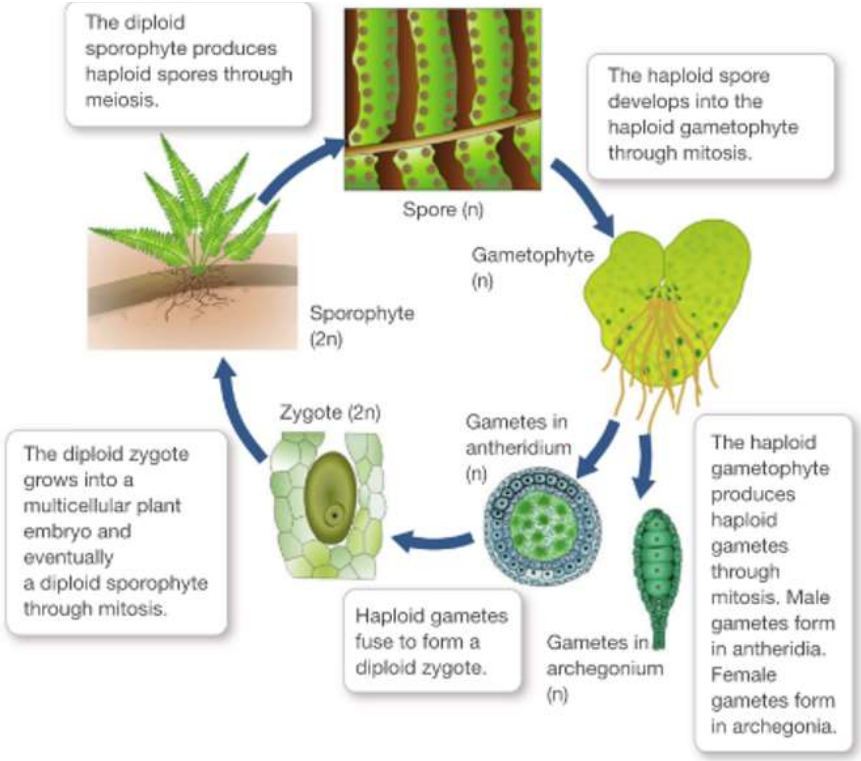

FIGURE 4 Alternation of generations in a species of fern. The fern is an example of an early vascular plant species that alternates generations in a cycle of haploid and diploid organisms.