Sexual Reproduction

Chapter 3 – Sexual Reproduction BC Science Probe 9 pages 72 - 105





Textbook

Read pages 74 – 77

Sexual Reproduction

Is reproduction involving two parents

Each parent contributes equal DNA to the offspring

Multicellular organisms have 2 cell types: Somatic cells

Gametes (sex cells)

Somatic cells (body cells) with 46 chromosomes and reproduce by mitosis



Gametes are sex cells and have only 23 chromosomes

Male sex cells are called sperm

Female sex cells are called ova (eggs)



Sexual reproduction involves fusing two cells (sperm and ovum) together

Fusing cells mean fusing DNA

Sexual reproduction involves fusing two cells (sperm and ovum) together Fusing cells mean fusing DNA

So how come sexual reproduction doesn't cause offspring to have 2 times the DNA of the parents?!?

Meiosis is the process of making gametes, which have half the DNA of somatic cells

It only happens in reproductive cells

Parent cells have a full set of chromosomes are called diploid (*2n*) Gametes have half the DNA are called

haploid (*n*)

Diploid cells (2n) have homologous chromosomes: a pair of chromosomes that are exactly the same

Each parent gives 1 chromosome (*n*)

Clarification:

Humans have 46 chromosomes

We have 23 pairs of homologous chromosomes

That means, we have two of each chromosome

Stages of Meiosis

Meiosis Summary

- Two parts Meiosis I and Meiosis II
- Begins with a diploid parent cell (2n) and ends with 4 haploid daughter cells (n)
- Sister chromatids stay together in Meiosis I but separate in Meiosis II

Textbook Questions

Read pages 74 – 77 Answer questions ALL

Textbook

Read pages 79 – 81

Sexual Reproduction

Sexual reproduction occurs through fertilization, the fusing of two haploid gametes (*n*) into a diploid zygote (2*n*)

Sperm (*n*) + ovum (*n*) = zygote (2*n*) 23 + 23 = 46

Sperm (n) + ovum (n) = zygote (2n)

Sexual Reproduction

The point of sexual reproduction is the mixing of genes to create diversity

We will examine diversity in this class. Remember that diversity means variation among individuals of a species.

 Organize yourselves in order of height (from shortest to tallest). You have 1 minute.

 Organize yourselves in order of height (from shortest to tallest). You have one minute.

 Organize yourselves in order shoe size from largest to smallest. You have one minute.

3. Organize yourselves into order of eye colour, from darkest to lightest.

Don't copy this.

You should have seen that there are differences between everyone. Some differences are obvious and some are not.

Sexual reproduction accounts for this variation.

We all have genes for eye colour

Differences in traits are caused by different alleles, or forms of the same gene

- Alleles can be dominant or recessive Dominant allele will express (show) its trait
- Recessive alleles will only express the trait if both chromosomes have the recessive allele

Terms

- Homozygous dominant
 - Two alleles for the dominant trait (ex. AA)
- Homozygous recessive
 - Two alleles for the recessive trait (ex. aa)
- Heterozygous
 - One of each allele (ex. Aa)

Punnett Squares

 Used to determine possible phenotypes (what something looks like) from their genotypes (what is written in their genes)

Punnett's Squares

These show the 2 alleles of each parent plant crossed with each other and the resulting 4 possible offspring with T = tall, t = short.

TT = dominant tall, tt = recessive short, Tt = mixed hybrid

- TT = dominant tall (genotype tall, phenotype tall)
- Tt = mixed hybrid (genotype hybrid, phenotype tall)
- tt = recessive short (genotype short, phenotype short)

Using the Punnett's Squares below, name the offspring of all possible parent combinations.

One parents is dominant tall, one is mixed

hybrid, name the 4 possible offspring.

2.

Т

Both parents are mixed hybrids, name the 4 possible offspring and the expected ratio.

Punnett Squares Worksheet

Punnett square worksheet

Complete the following monohybrid crosses: draw a Punnett square, list the ratio and describe the offspring. Be sure to remember that the **capital letter is dominant**.

G

Example)

A green pea plant (GG) is being crossed with a green pea plant (Gg).

G

GenoType= 2 GG: 2 Gg; 0 gg

Phenotype= 4 Green pea plants: 0 other color

1) A green pea plant (Gg) is crossed with a yellow pea plant (gg).

Incomplete dominance is when both alleles are expressed, you get a mixture of traits

Codominance occurs when both traits are expressed at the same time

Asexual vs Sexual Reproduction: Advantages

Asexual

- Well suited organisms thrive
- Only 1 parent needed Rapid reproduction

Sexual

- Offspring can adapt to environment
- Survivors pass on "good" traits
Asexual vs Sexual Reproduction: Disadvantages

Asexual

Genetically identical offspring -> 1 disease will kill all

Sexual

Need to find a mate Few offspring produced Slow reproduction rate

Asexual vs Sexual Reproduction

Complete the worksheet comparing asexual and sexual reproduction

Textbook Questions

Read pages 79 – 81 Answer questions 2, 4 – 6, 8, 9, 11 – 13

Methods of Sexual Reproduction

Sexual fertilization means that DNA must be exchanged between two individuals

Organisms need specialized structures to exchange DNA

Textbook

Read pages 83 – 86

Methods of Sexual Reproduction

3 methods are:

Conjugation

Separate sexes

Conjugation

Is the exchange of DNA in 2 unicellular organisms that usually reproduce by binary fission

Organism copies a piece of DNA called a plasmid, and donates it to another cell

Conjugation





Many organisms have separate male and female individuals

Females produced ova while males produce sperm

Animals have 2 methods of fertilization: external fertilization internal fertilization

- **External Fertilization**
- Mostly occurs in aquatic environments
- Many gametes usually produced
- gametes fuse outside the body
- Sperm released over eggs to fertilize them
- Very high death rate

External Fertilization



Internal Fertilization

- Fertilization happens inside some female animals
- Sperm is deposited inside the body
- Usually produces fewer offspring because death rate is very low

Internal Fertilization



Organisms that are sessile (cannot move) are often hermaphrodites

Hermaphrodites have both male and female sex organs, so they can mate with any member of their species

Hermaphroditism guarantees that every encounter ends in mating













Read pages 83 – 85 on Hermaphrodites

Textbook Questions

Re-read pages 84 – 86 Answer questions 2, 3, 5, 6, 7, 9, 11, 13, 14

Development of the Zygote

- A zygote becomes an embryo after some time
- The **embryo** is the developing organism and are **protected** in 3 ways:
- 1. Inside seeds
- 2. Inside eggs
- 3. Inside a mother

Seeds

Seeds are fertilized plant eggs

- Seeds contain the embryo as well as stored food (starch or sugar)
- They develop inside the ovary which becomes a fruit

Seeds (page 88 fig. 1)

Fruit and Seed Formation

Pollen lands on a stigma

- Sperm swim down a pollen tube toward the ovary
- Eggs are fertilized
- Eggs become seeds
- Ovary becomes fruit

Seeds

Complete worksheet Label the diagram using page 88 fig. 1

Seeds

There are 2 different types of seeds **monocotyledons dicotyledons** A cotyledon is a seed leaf Mono- means 1, Di- means 2

Seeds - Dicotyledon



Seeds - Monocotyledon



Seeds

When seeds germinate, they will use the cotyledons for food

- Dicots use the whole cotyledon
- Monocots use the endosperm

Seeds



Most animals lay amniotic eggs

Eggs offer protection through a shell or a jelly-like substance

Eggs








Eggs



Eggs





All mammals (except 2) develop their embryos inside the mother

Marsupials

Short development time inside mother

Embryos crawl from uterus to pouch



Placental Animals

embryo develops for a longer period inside mother

Placenta supplies nutrients to the fetus (stage after embryo) via the umbilical cord



umbilical cord



fetus

Textbook Questions

Read pages 88 – 91 Answer questions pg 92 1, 3, 6, 9, 11, 13

Chapter 3 Review

When you are finished, answer page 104 – 105 review questions 1 – 11, 16 – 20, 22 – 24

Test is Tuesday Oct 28