CONCEPT: CHROMOSOMAL MUTATIONS: ABERRANT EUPLOIDY

● **Chromosomal mutations** describe alterations in chromosome structure or number of chromosomal copies

□ There are two _____ of chromosomal mutations

1. **Aberrant euploidy** refers to changes in the whole set of chromosomes

2. **Aneuploidy** refers to changes in parts of a single, or few chromosomes

Aberrant Euploidy

● There are a number of _____ to describe various types of chromosomal mutations

□ **Euploid** describes organisms with multiples of the basic chromosome set

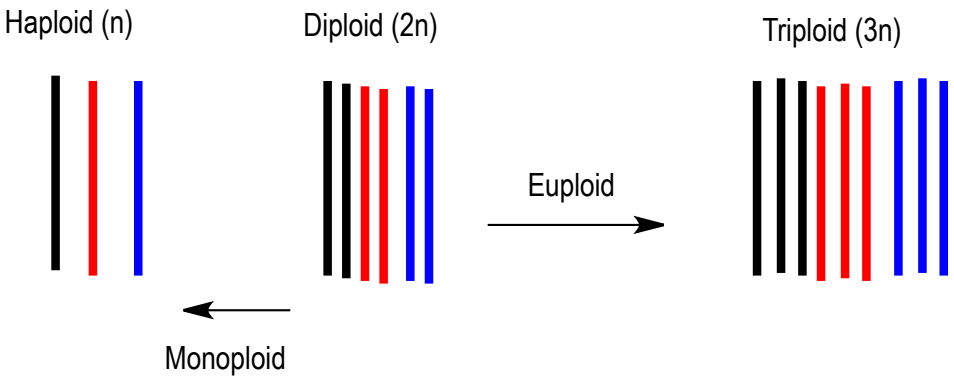
- Can contain more or fewer numbers of the normal set of the chromosomes

□ **Monoploids** describes normally diploid organisms that contain only one chromosome set

- **Parthenogenesis** describes the development of unfertilized egg into embryo without fertilization

- Ex: male bees, wasps, ants

EXAMPLE:



□ **Polyploids** have _____ than two chromosome sets

- *Triploid (3n), tetraploid (4n), pentaploid (5n), hexaplid (6n)*

- They are divided into two classes:

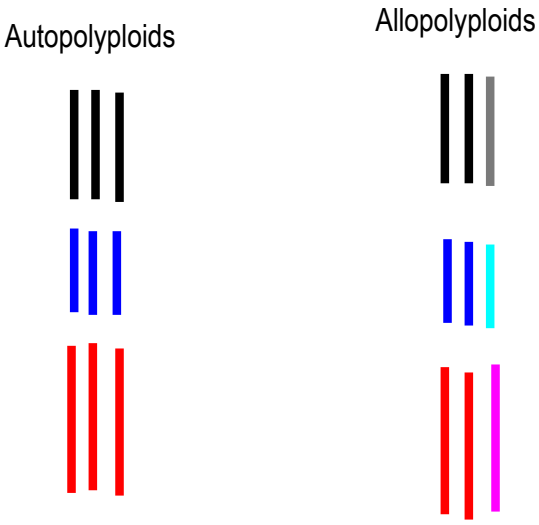
- **Autopolyploids** contain multiple chromosome sets from within one species

- **Allopolyploids** contain multiple chromosome sets from two closely related species

- Sets are called **homeologous** (semi-homologous)

- Mostly occurs in plants, but can occur in animals too

EXAMPLE:



Autopolyploidy

□ *Autopolyploids* are typically triploids

- Usually, they are _____ – but their gametes receive either two or one chromosome from each pair

- Creates **aneuploidy** which describes organisms with mixtures of diploid and haploid chromosomes

  - Not all triploid pairs segregate equally

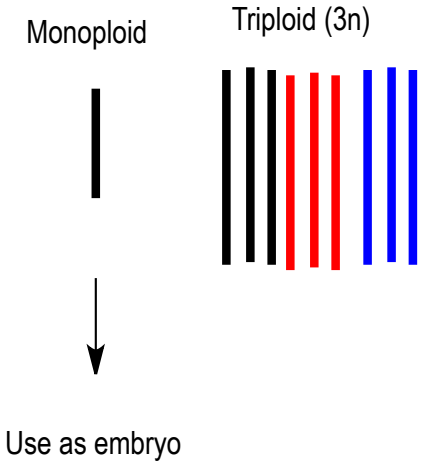
□ There are many classes of autopolyploids

- **Monoploids** – formed by using a haploid cell meant for fertilization as an embryo

- **Autotriploids** – have triploids in each set (Ex: bananas) (3n)

- **Autotetroploids** – typically result in larger sizes or flowers in plants/crops

EXAMPLE:



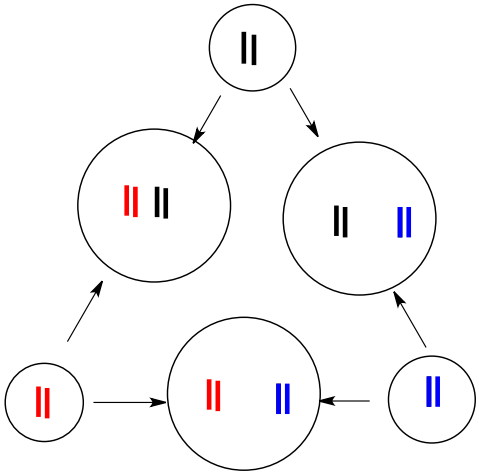
Allopolyploidy

□ *Allopolyploids* describes _____ that is a hybrid of two or more species

- Usually, they are sterile – but their gametes receive either two or one chromosome from each pair

- Most of these are synthetically created for crop plants (Ex: cotton and wheat)

EXAMPLE:



□ **Endopolyploidy** describes diploid organisms where certain cells are polyploidy

- Ex: Flowering plants, gut of mosquito larva, human liver cells

□ **Colichicine** is a chemical that can induce nondisjunction in a laboratory

PRACTICE

1. Which of the following chromosomal mutations increases the amount of genetic material from all chromosomes?
    a. Aberrant Euploidy
    b. Aneuploidy
    c. Monoploidy
    d. Tetraploidy

2. True or False: Autopolyploids contain multiple chromosomal sets from two closely related species
    a. True
    b. False

3. A species has 2n = 20. How many chromosomes will be found per mutant cell in an autotriploid organism.
    a. 10
    b. 20
    c. 30
    d. 60