

POLYPLOIDY

BY

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Polyploidy

Two major types

- Autopolyploidy

In which all chromosomes sets are from a single species

- Allopolyploidy

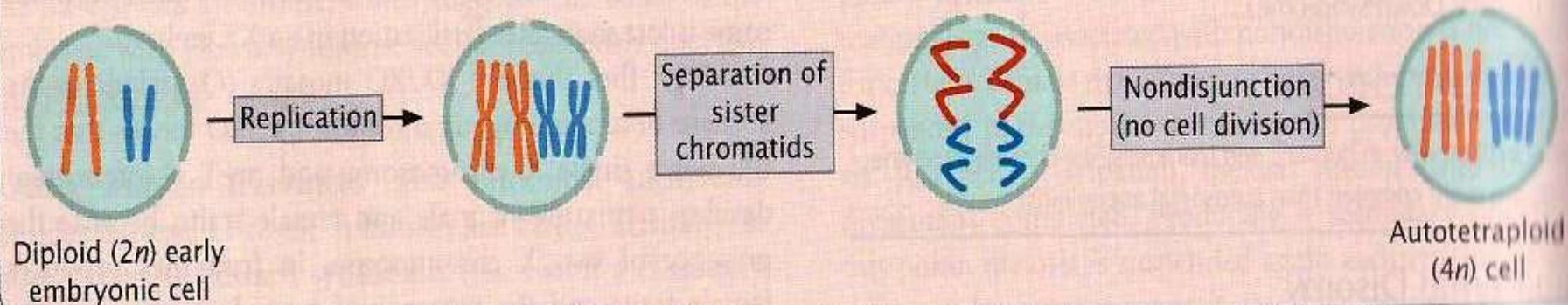
Chromosomes sets are from two or more species

Autopolyploidy

- It occurs due to accidents of meiosis or mitosis which produce extra sets of chromosomes
- Nondisjunction of all chromosomes in mitosis in an $2n$ embryo having double chromosome number are known as **Autotetraploid**
- When nondisjunction in meiosis produces a diploid gamete that then fuses with a normal haploid gamete to produce a triploid zygote.

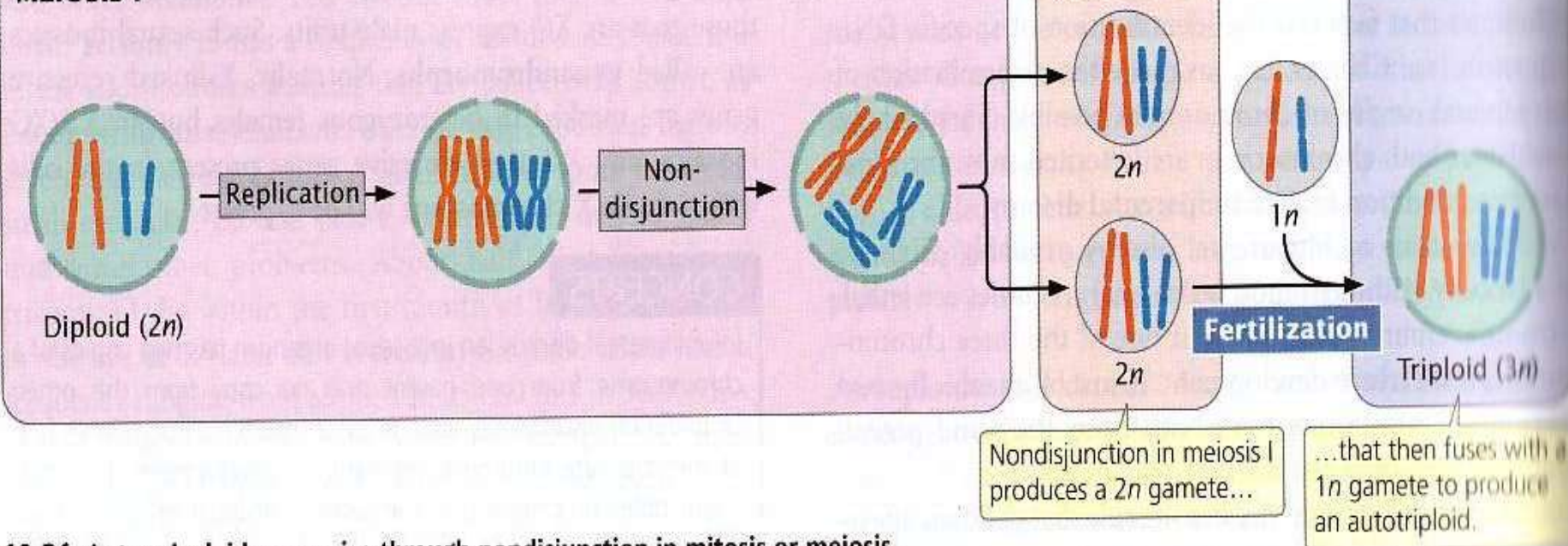
(a) Autopolyploidy through mitosis

MITOSIS



(b) Autopolyploidy through meiosis

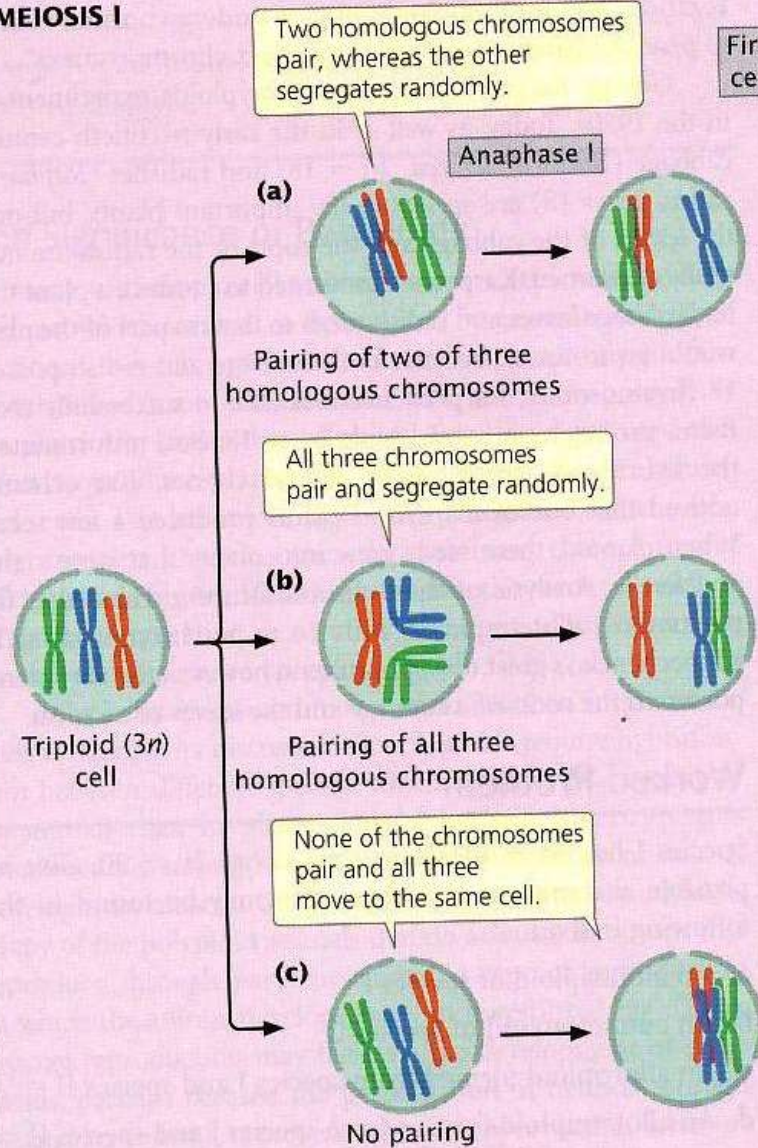
MEIOSIS I



10.26 Autopolyploidy can arise through nondisjunction in mitosis or meiosis.

- Triploids may arise from across between an autotriploid that produces $2n$ gametes and a diploid that produces n gametes.
- When unbalanced gamete fuses with a normal gamete the resulting zygote has different number of chromosomes. Which is often **lethal**. For this reason triploids do not usually produce **viable offspring**.

MEIOSIS I



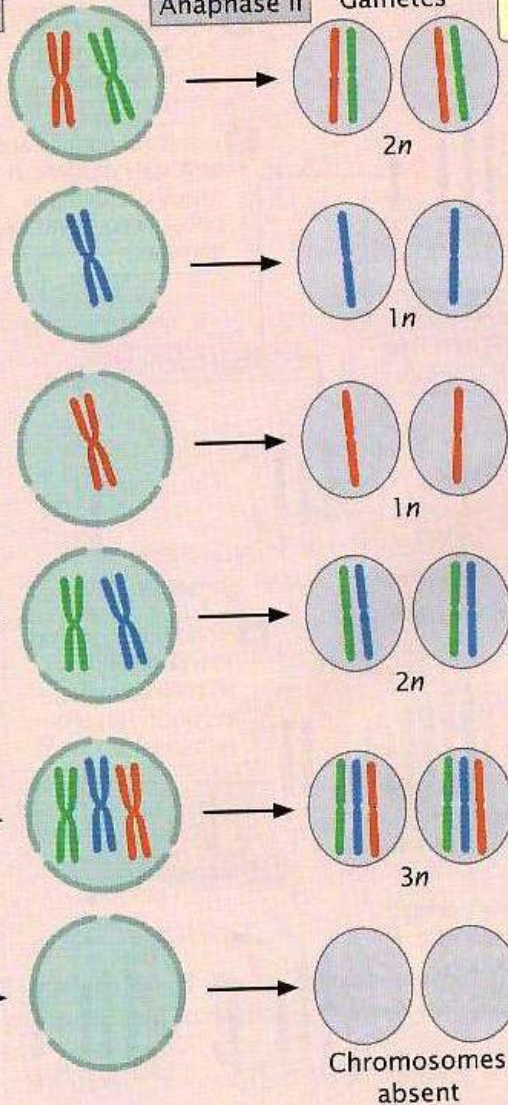
MEIOSIS II

First meiotic cell division

Anaphase II

Gametes

Some of the resulting gametes have extra chromosomes and some have none.



10.27 In meiosis of an autotriploid, homologous chromosomes can pair or not pair in three ways. This example illustrates the pairing and segregation of a single homologous set of chromosomes.

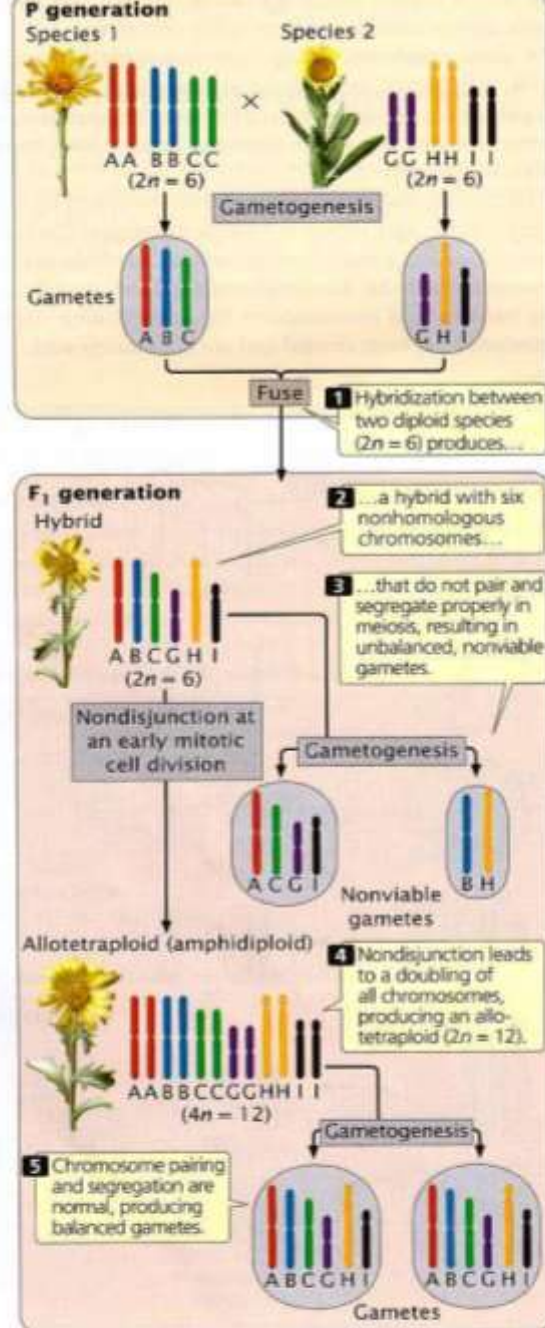
Allopolyploidy

- It can arise from two species are sufficiently related that hybridization takes place between them.

- Amphidiploid

Allopolyploidy consisting of two combined diploid genomes is called as amphidiploid.

AABBCCGGHHII



10.28 Most allopolyploids arise from hybridization between two species followed by chromosome doubling.

Significance of Polyploidy

- Increase in chromosome number in polyploidy is often associated with an increase in cell size and many polyploids are physically larger than diploids
- Breeders have used this effect to produce plants with larger leaves, flowers, fruits and seeds.
- The seeds of modern wheat are larger than those of its ancestors.

References

- <https://en.wikipedia.org/wiki/Polyploid>.
- <https://www.slideshare.net>