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The genetic significance of mitosis and meiosis

Modul no. 1: Animal Genetics

Tomáš Urban

Mendel University in Brno, Faculty of AgriScience

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Heredity is linked to cell division and chromosome behaviour

Gregor Mendel was the first to recognize that processes related to his elements during gamete formation are closely related to heredity. He knew nothing about chromosomes in his time.

Chromosomal theory of inheritance

- Walter Flemming described the behavior of chromosomes during cell division
- It was not until after 1900 that the connection between Mendel's discrete units - elements and their location on chromosomes during cell division - was demonstrated.
- Discrete units within the nucleus (locus on chromosome) became an integral part of scientists´ideas about inheritance

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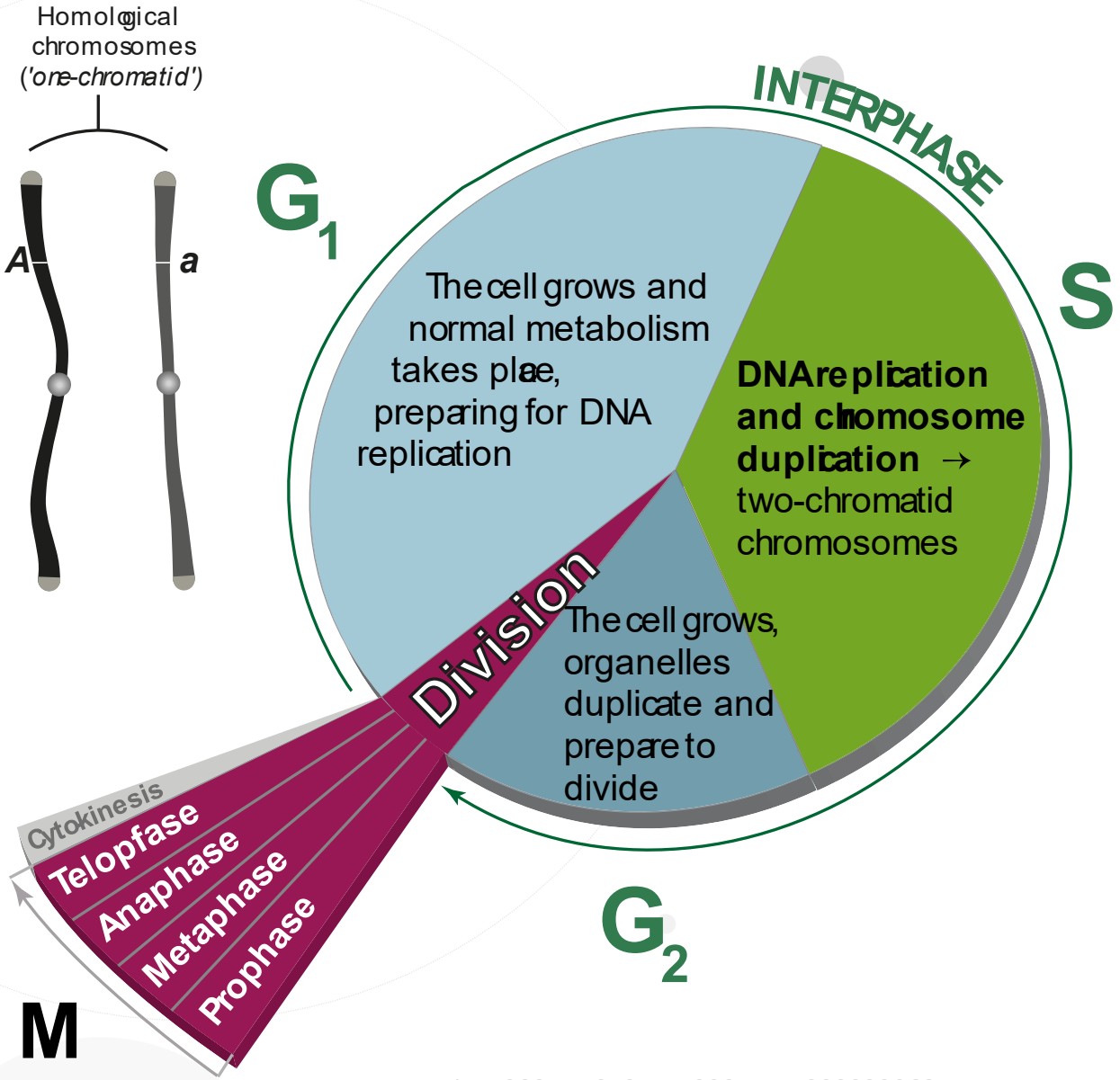
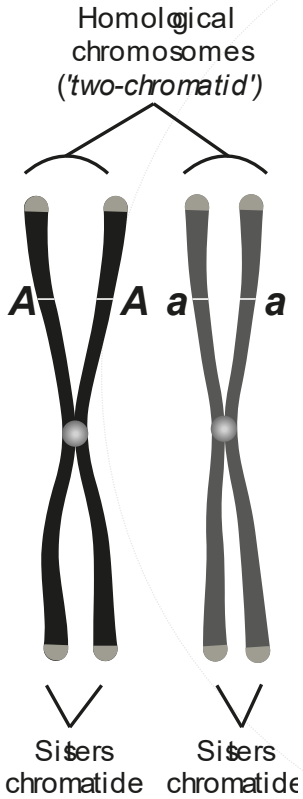
Homologous chromosomes during cell cycle





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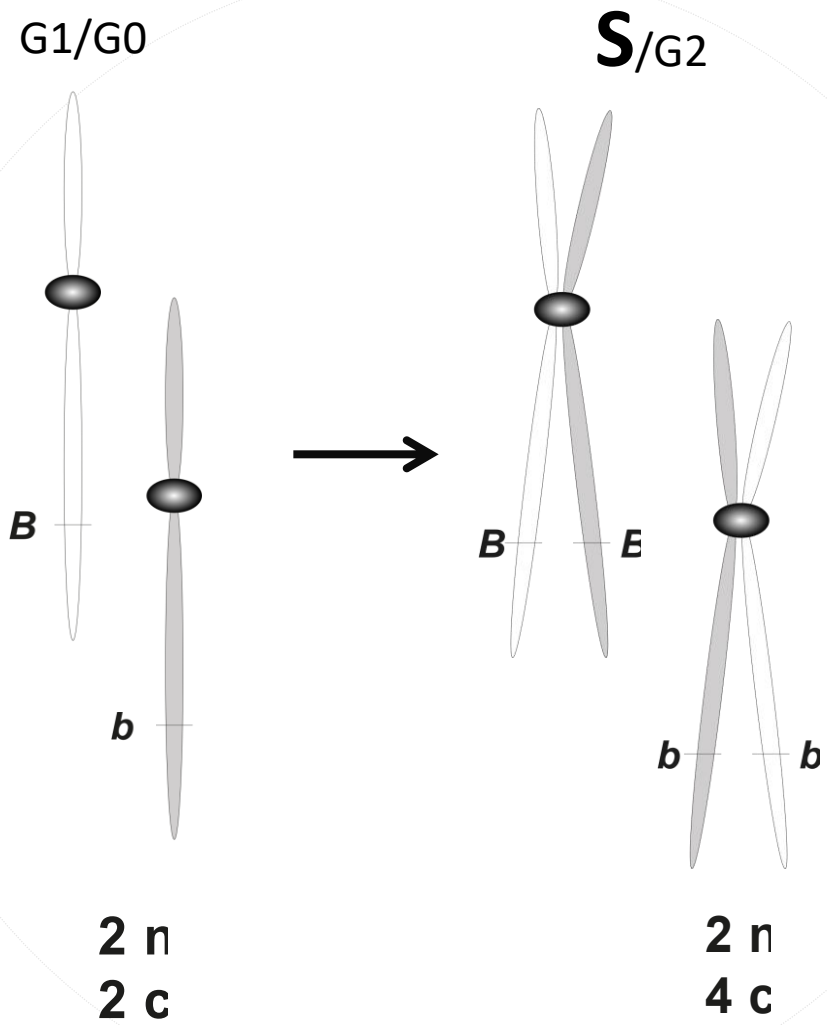
Homologous chromosomes during cell cycle



These two-chromatid chromosomes are involved cell division

mitosis

or

meiosis

n – number set of chromosomes (in diploid organisms is 2n
c – number of DNA (or chromatides)

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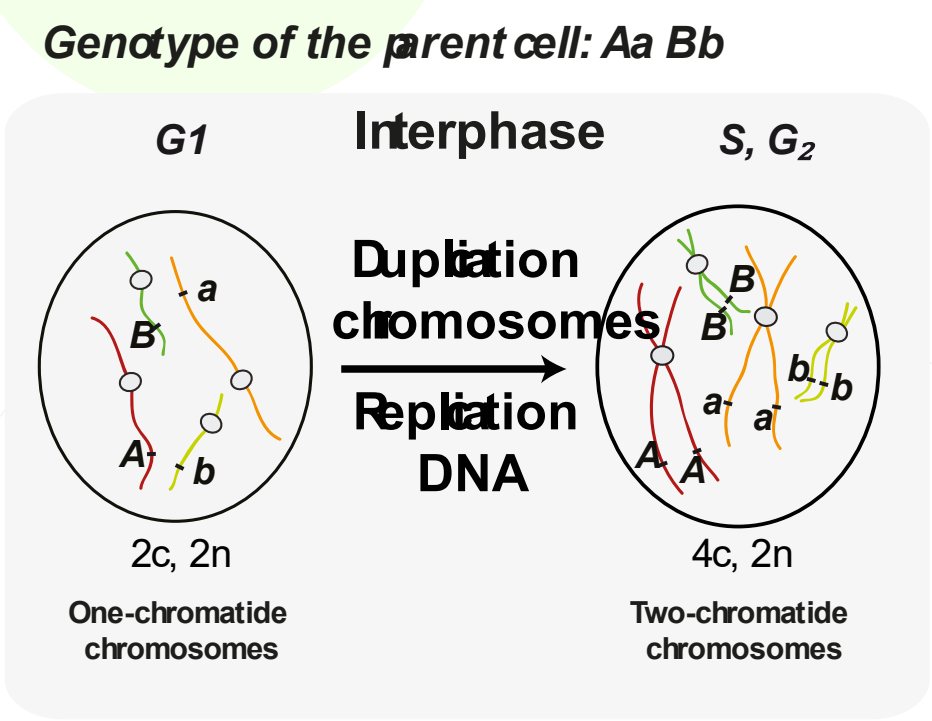
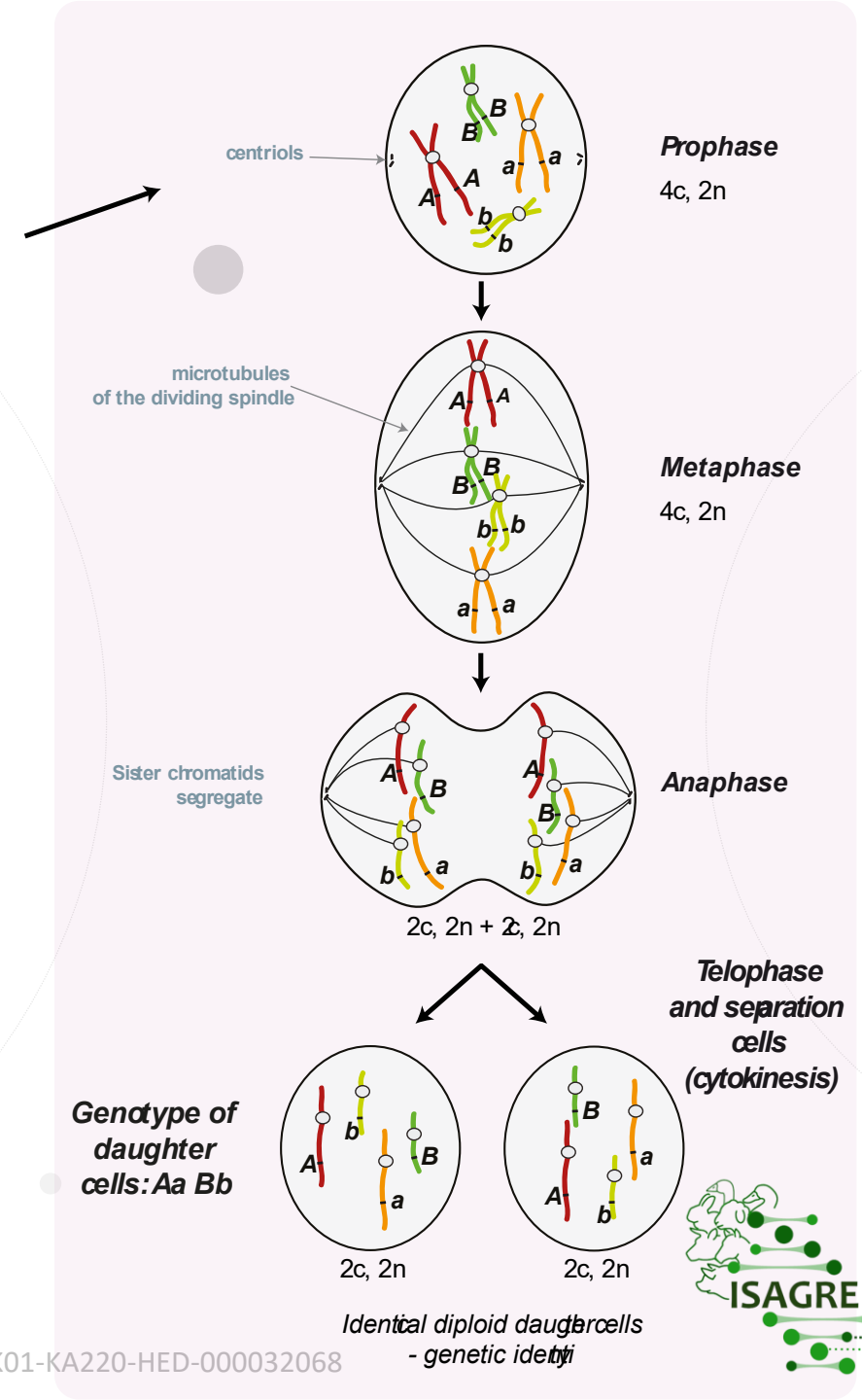
Mitosis





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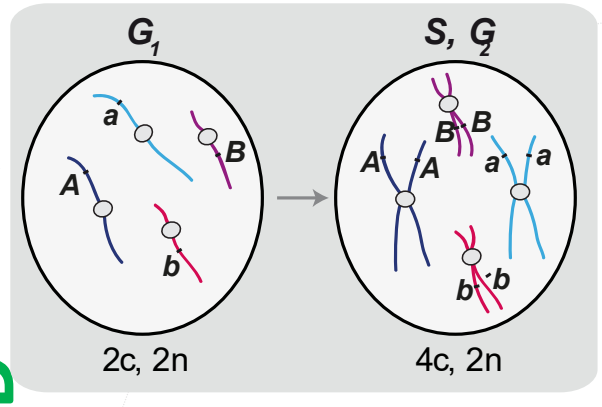
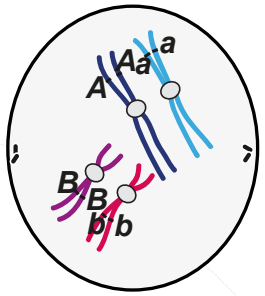
Meiosis I

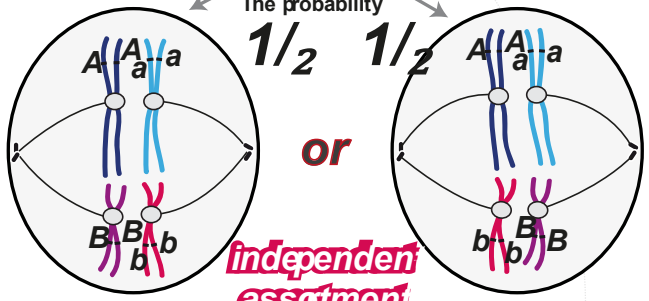




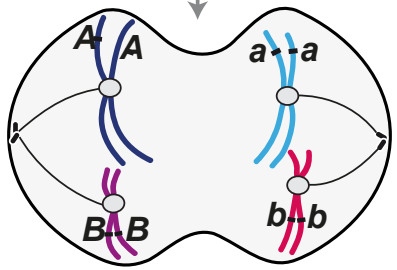
Homologous chromosomes are paired (synapse) and form a bivalent (tetrad)

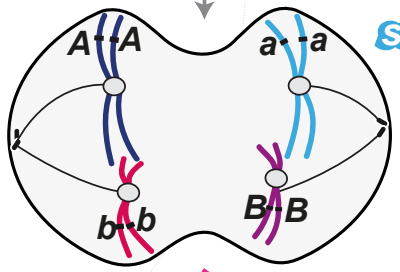
Prophase
4c, 2n

The probability
1/2 1/2
or
independent assortment



Metaphase
4c, 2n

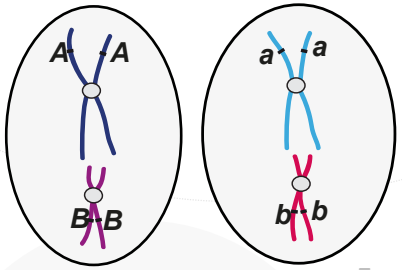




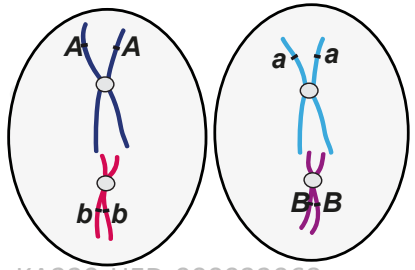
segregation

Segregate whole chromosomes

Anaphase
2c, 1n + 2c, 1n



HAPLOID CELLS
1N and 2C



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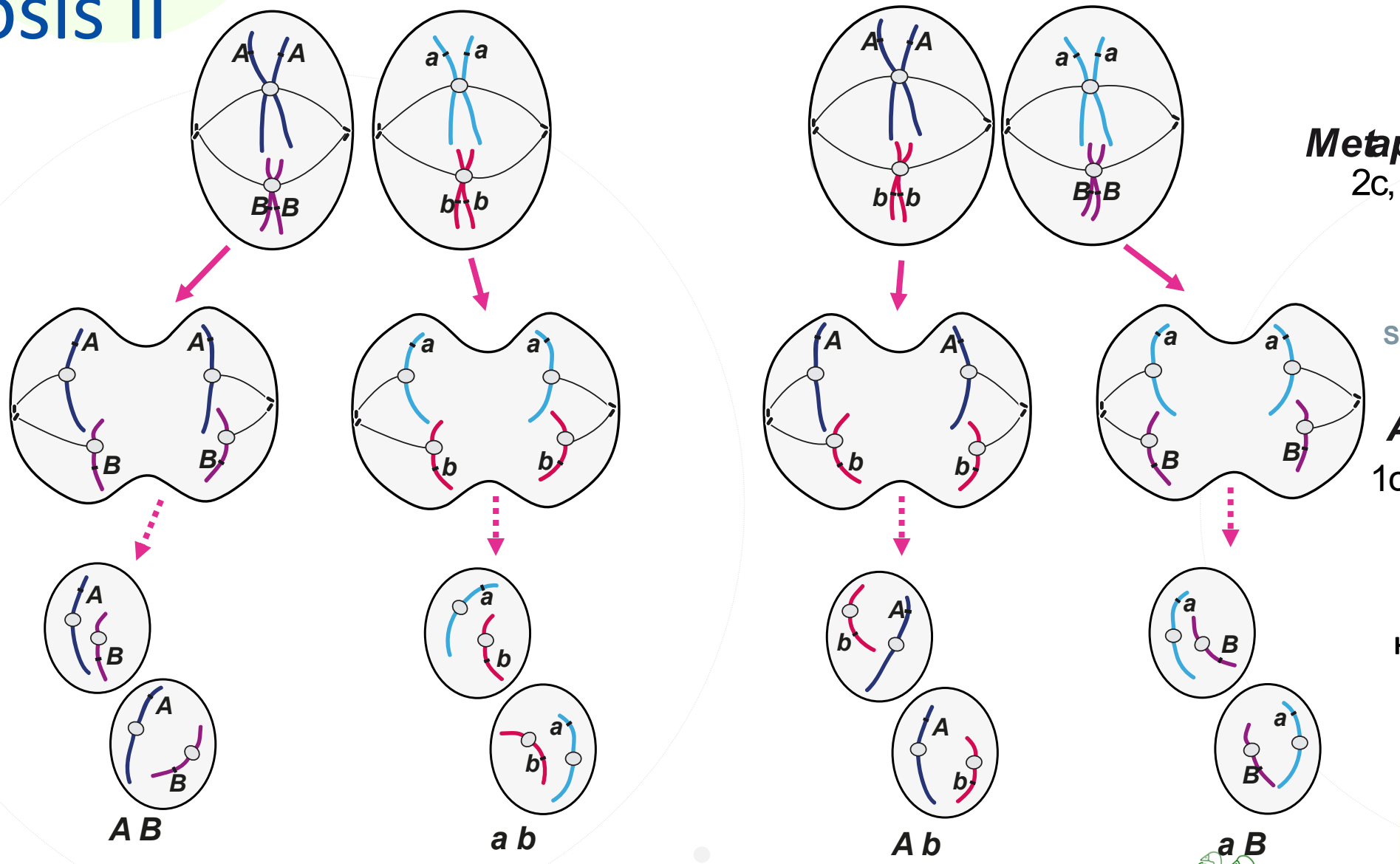
Meiosis II



Ratio of gamete types: 1 : 1 : 1 : 1

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MITOSIS

Heredity as the transmission of genetic information does not have to take place only through meiosis. In somatic cells of multicellular organisms, inheritance occurs by mitosis, when genetic material is equally divided into daughter cells.

MEIOSIS

Meiosis creates genetic variation in gametes as a result of independent assortment of alleles of different genes and as a result of recombination of alleles of different genes located on the same chromosome.

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Thank you for your attention!

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Tomáš Urban

urban@mendelu.cz

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