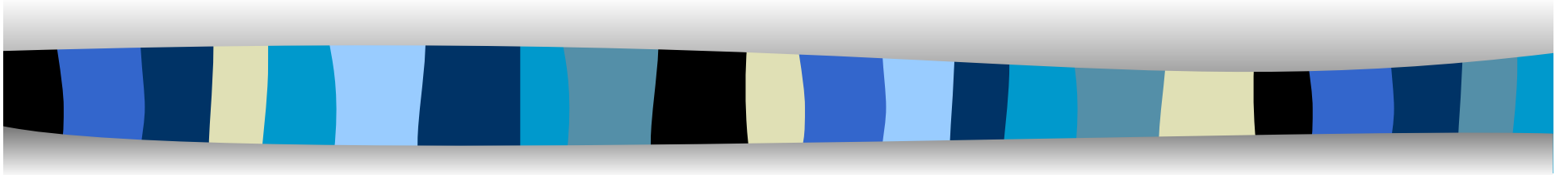


Meiosis

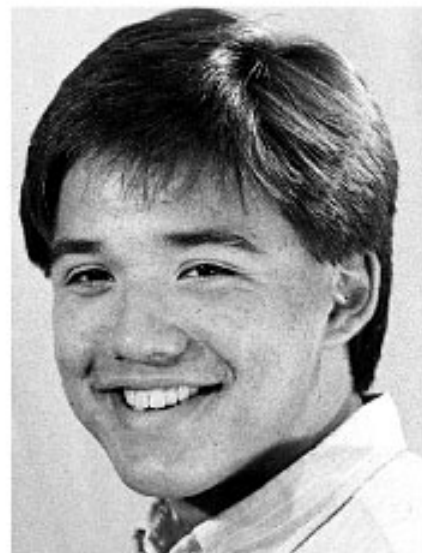
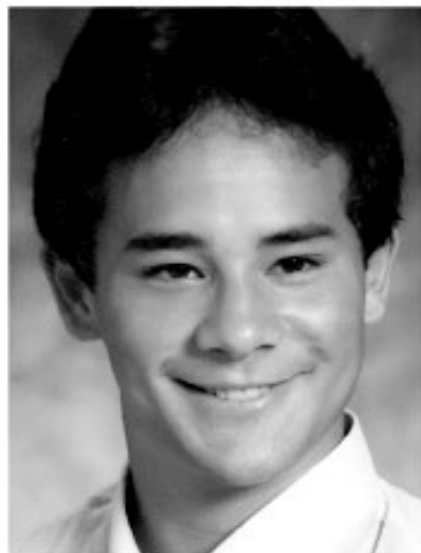


Chapter 11-4



Couple 1

Couple 2





Meiosis: cell division that reduces the number of chromosomes by $\frac{1}{2}$

- 1 diploid cell \rightarrow 4 haploid cells
- Meiosis produces gametes (sex cells)
 - Spermatogenesis = makes sperm
 - Oogenesis = makes eggs (ova)

[Video](#), [mitosis](#), [meiosis](#)



Genetic recombination:

a new mixture of genetic material is created.

⊕ Two steps in meiosis result in genetic recombination:

- 1. Prophase I: Crossing Over**
- 2. Metaphase/Anaphase I: Independent Assortment**

Mitosis

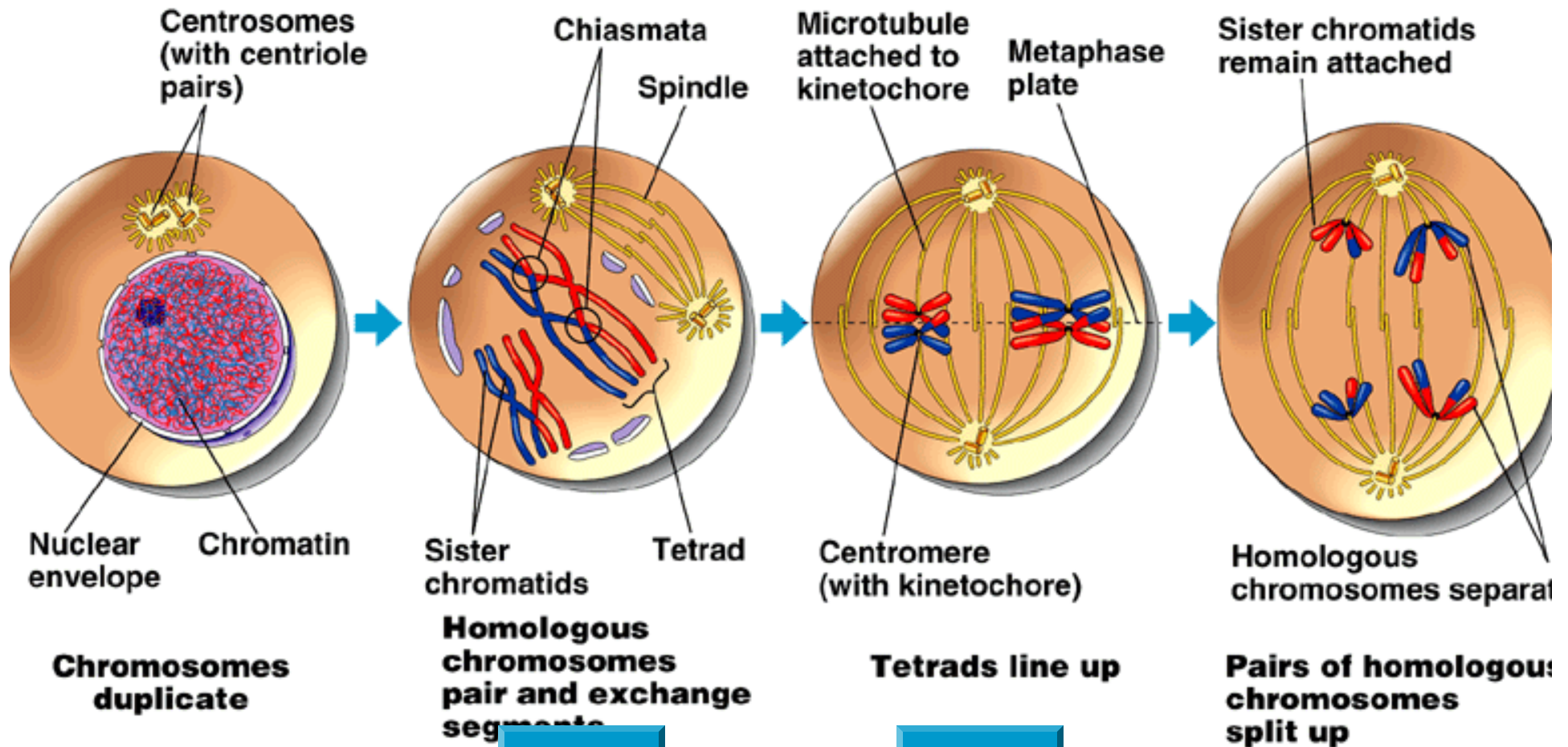
MEIOSIS I: Separates homologous chromosomes

INTERPHASE

PROPHASE I

METAPHASE I

ANAPHASE I



**MEIOSIS II:
Separates sister chromatids**

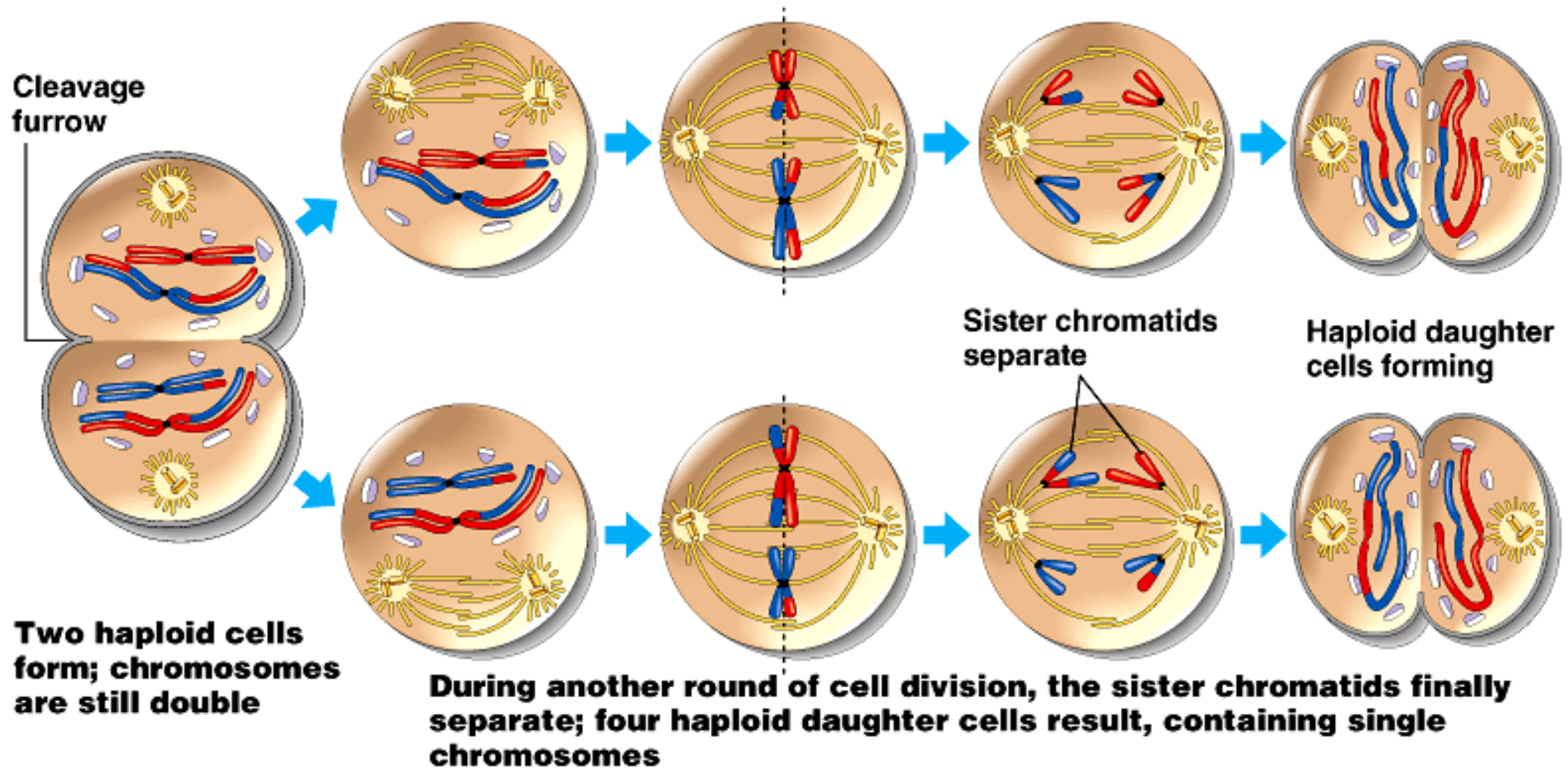
**TELOPHASE I
AND CYTOKINESIS**

PROPHASE II

METAPHASE II

ANAPHASE II

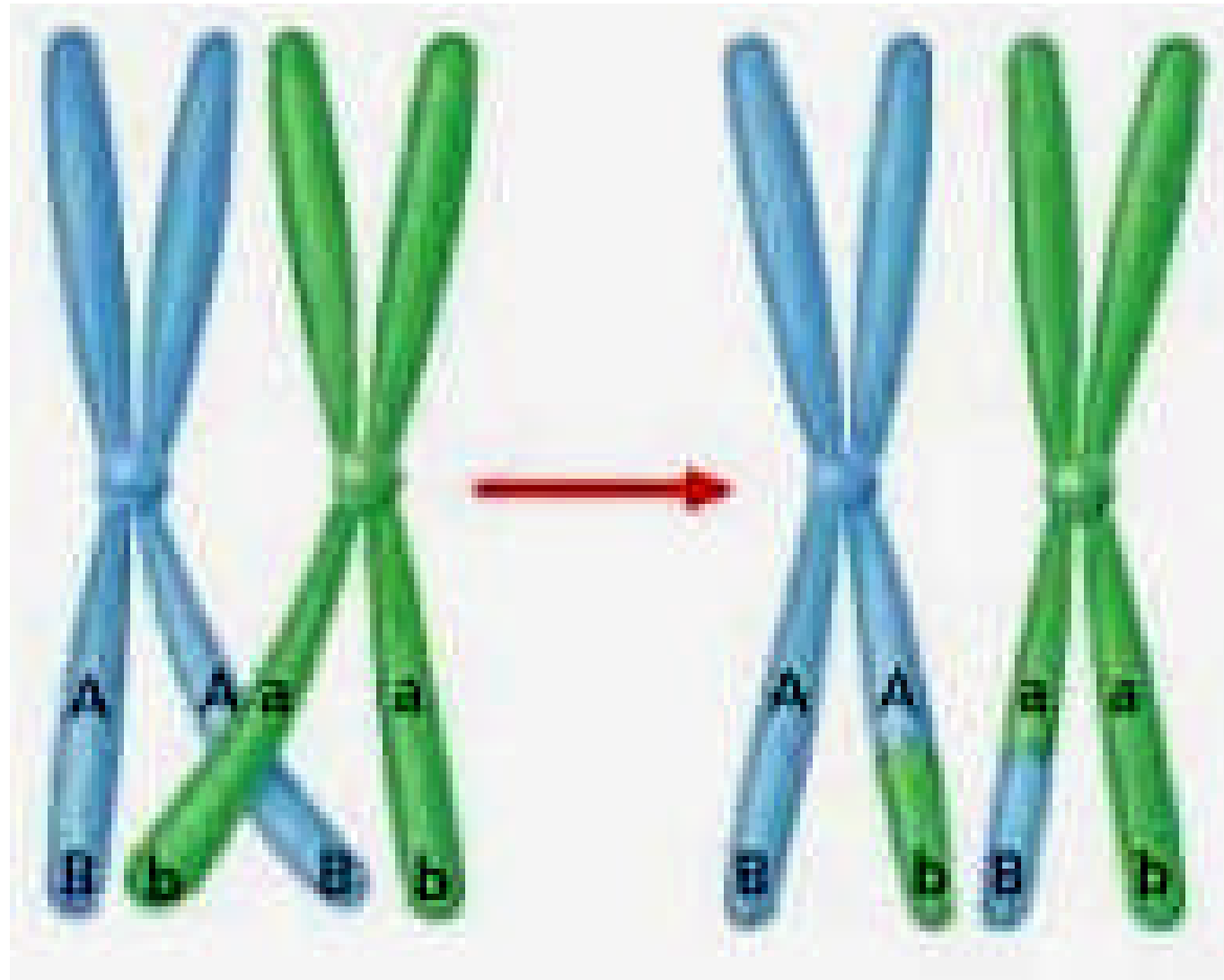
**TELOPHASE II
AND CYTOKINESIS**





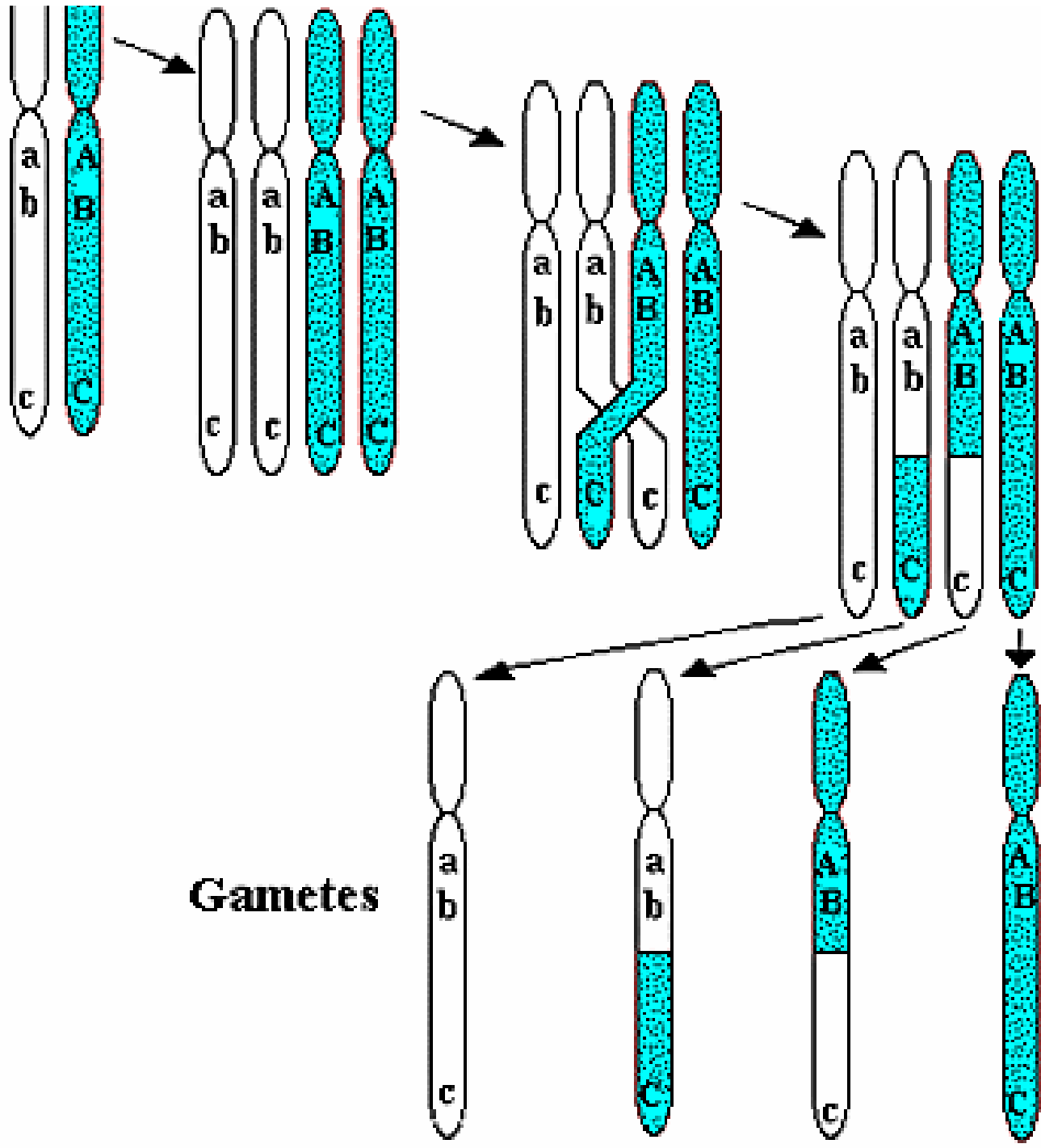
Crossing Over – Prophase I

- Homologous chromosomes pair up, forming a Tetrad.
- A portion of one chromatid is cut off and exchanged with the same section from the homologous chromosome.



* Notice how chromosomes are aligned so that the genes of one chromosome are aligned adjacent to corresponding genes on the other chromosome.



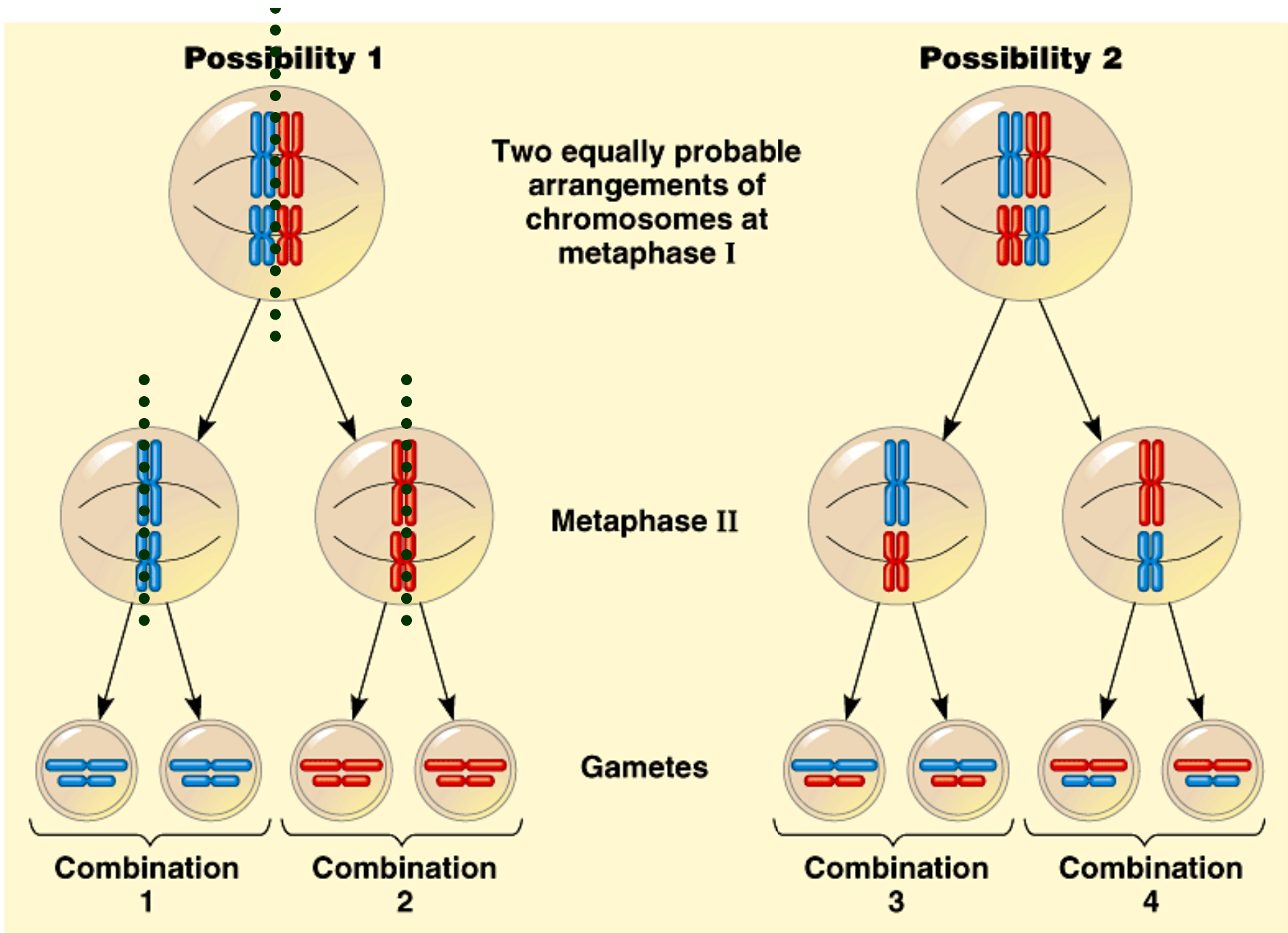


Gametes



Independent Assortment – Metaphase I

- Homologous chromosomes pair up with centromeres on each side of the dividing line.
- Genes located on different chromosomes are “assorted independently” of one another.

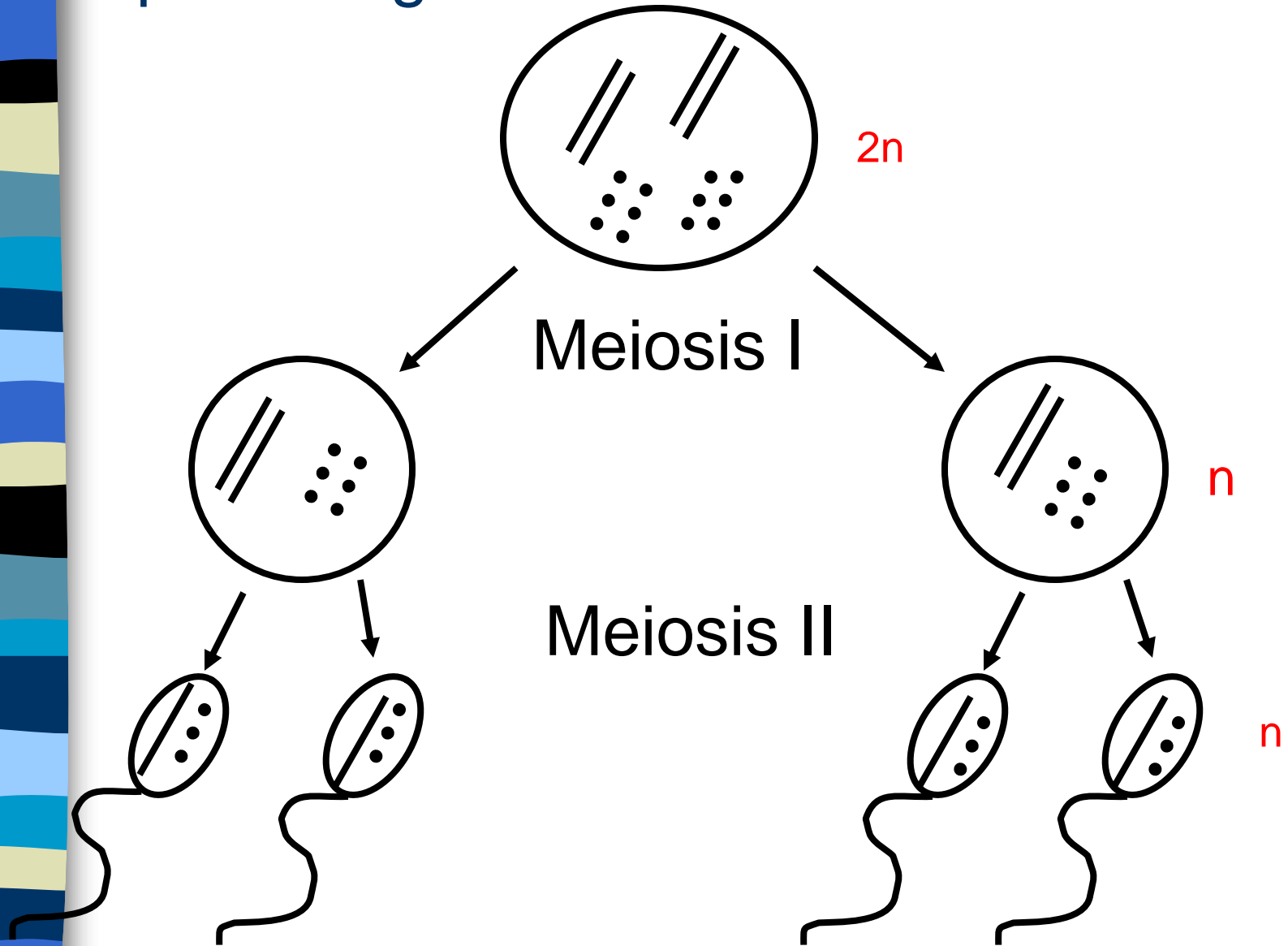




Spermatogenesis

- Production of sperm cells
- Happens in the testes
- 1 cell divides to form 4 viable sperm cells
- Happens throughout life

Spermatogenesis

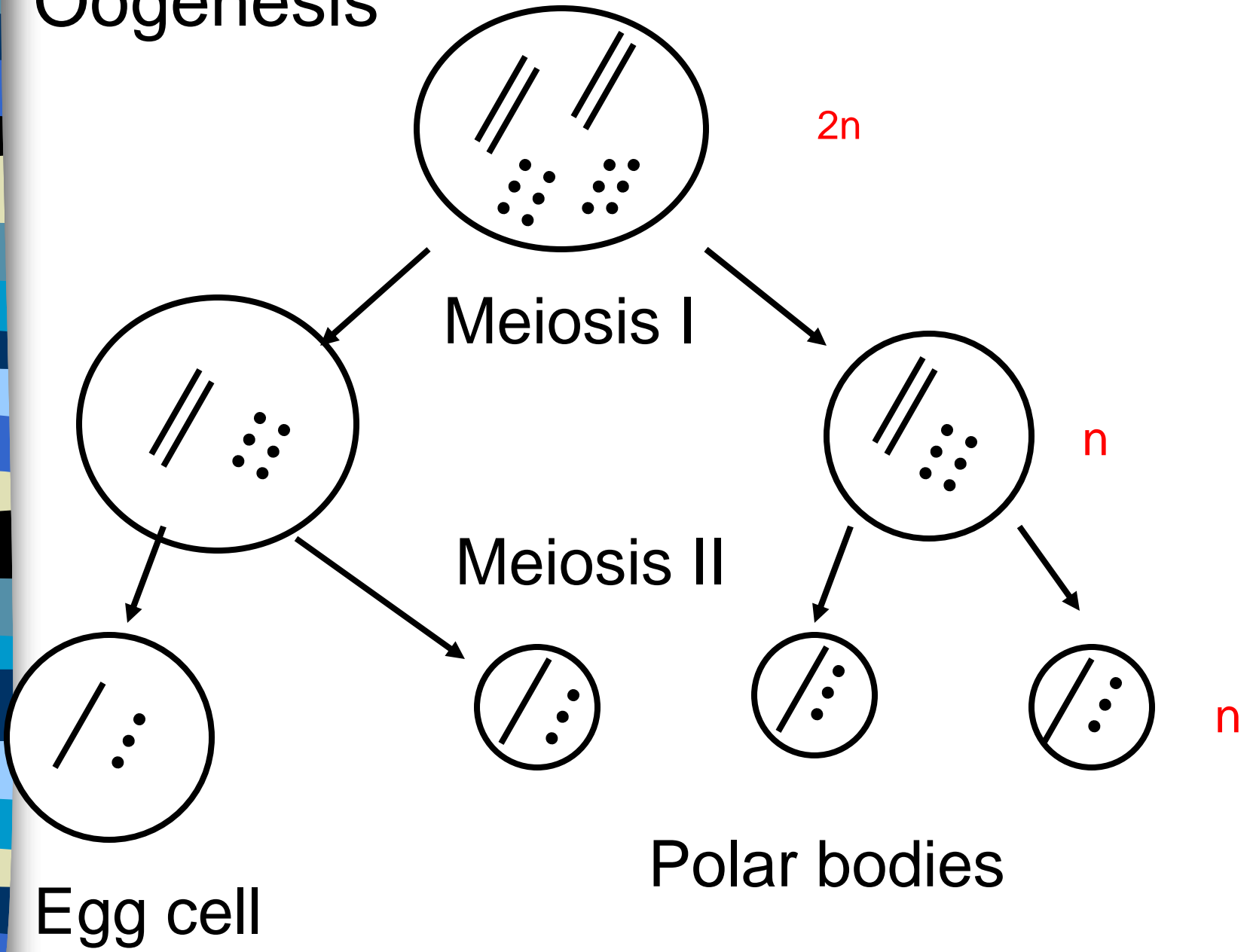


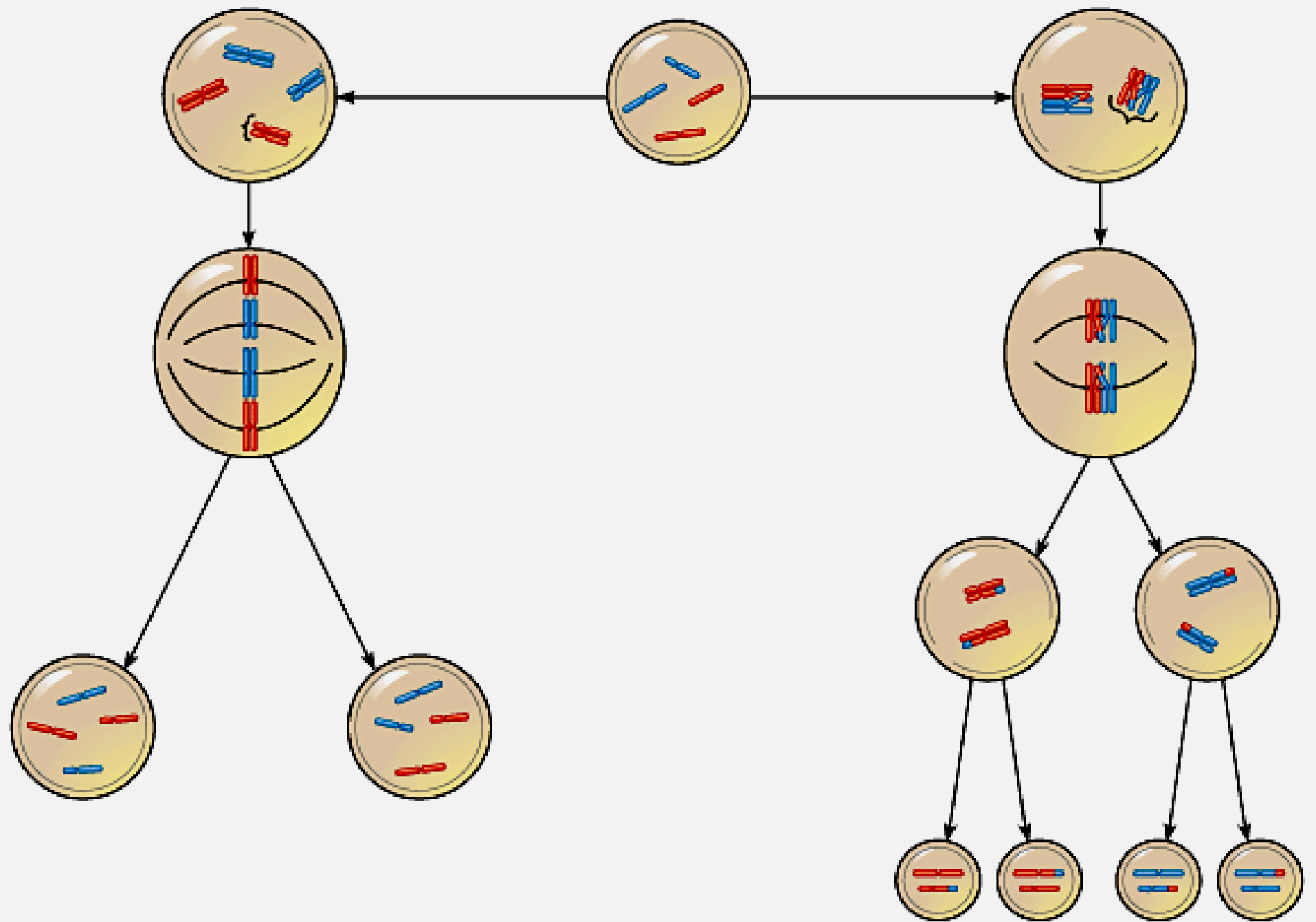


Oogenesis

- Production of egg cells
- Happens in the ovaries
- 1 cell divides to produce 1 viable egg (ova) cell and 3 non-viable egg cells (polar bodies)
- Women are born with all the eggs they will ever need

Oogenesis







Mitosis vs. Meiosis

Mitosis:

- $2n \rightarrow 2n$
- Cells divide once
- 1 cell \rightarrow 2 cells
- Happens in non-sex cells

Meiosis:

- $2n \rightarrow 1n$
- Cells divide twice
- 1 cell \rightarrow 4 cells
- Happens in sex cells
Testes \rightarrow Sperm
Ovaries \rightarrow Egg/Ovum



Sexual Reproduction

- Sexual Reproduction: production of offspring through 2 parents
- Sperm(n) and egg(n) combine to form a Zygote (2n)
- Meiosis is involved
- Half of an individual's DNA comes from each parent
- Offspring are genetically different from parents and from each other
- Sexual reproduction allows species to adapt rapidly to new conditions