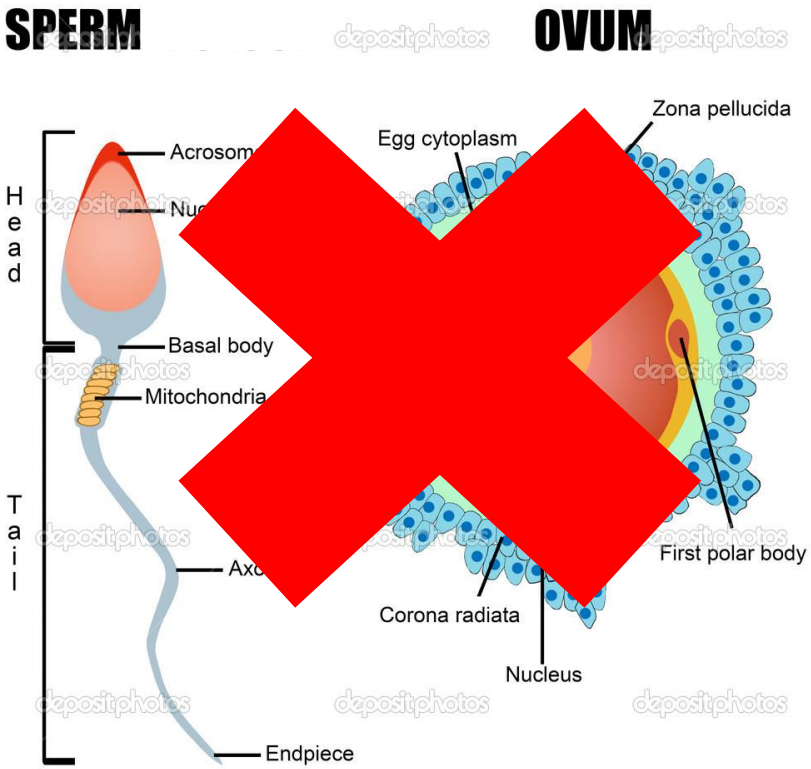
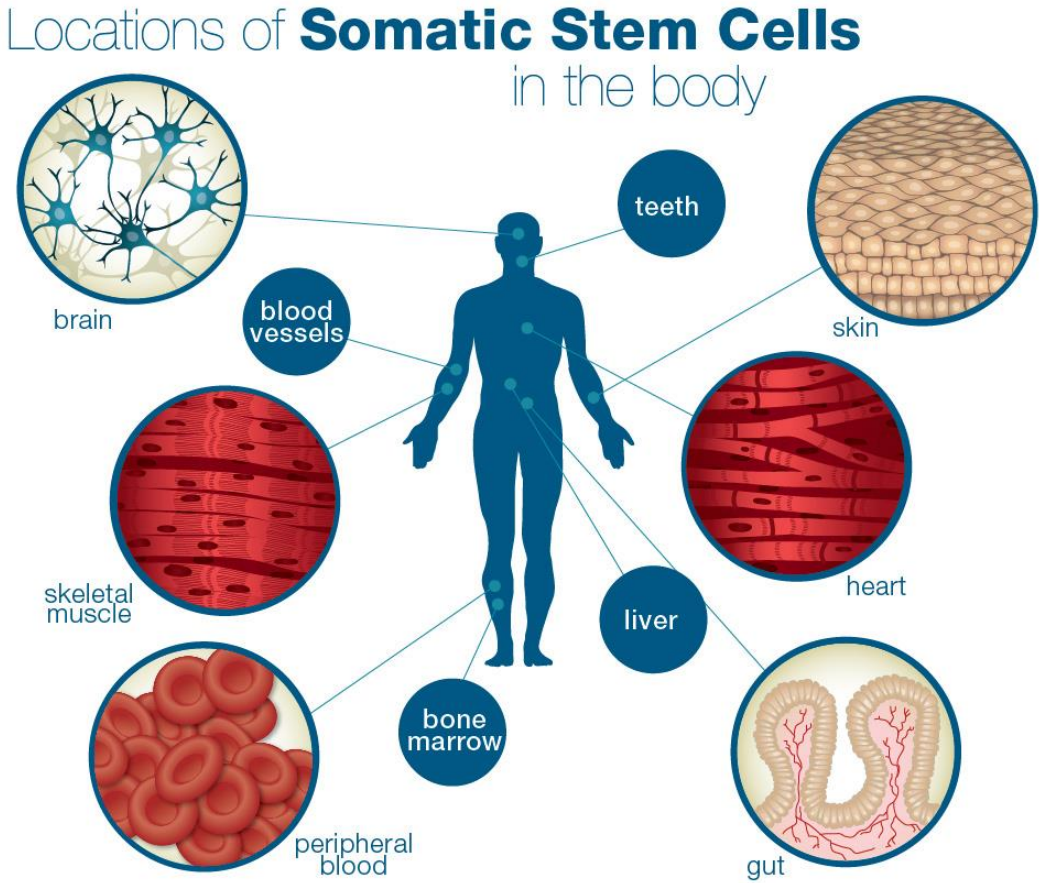
CHAPTER 10

CELL GROWTH AND DIVISION

Mitosis

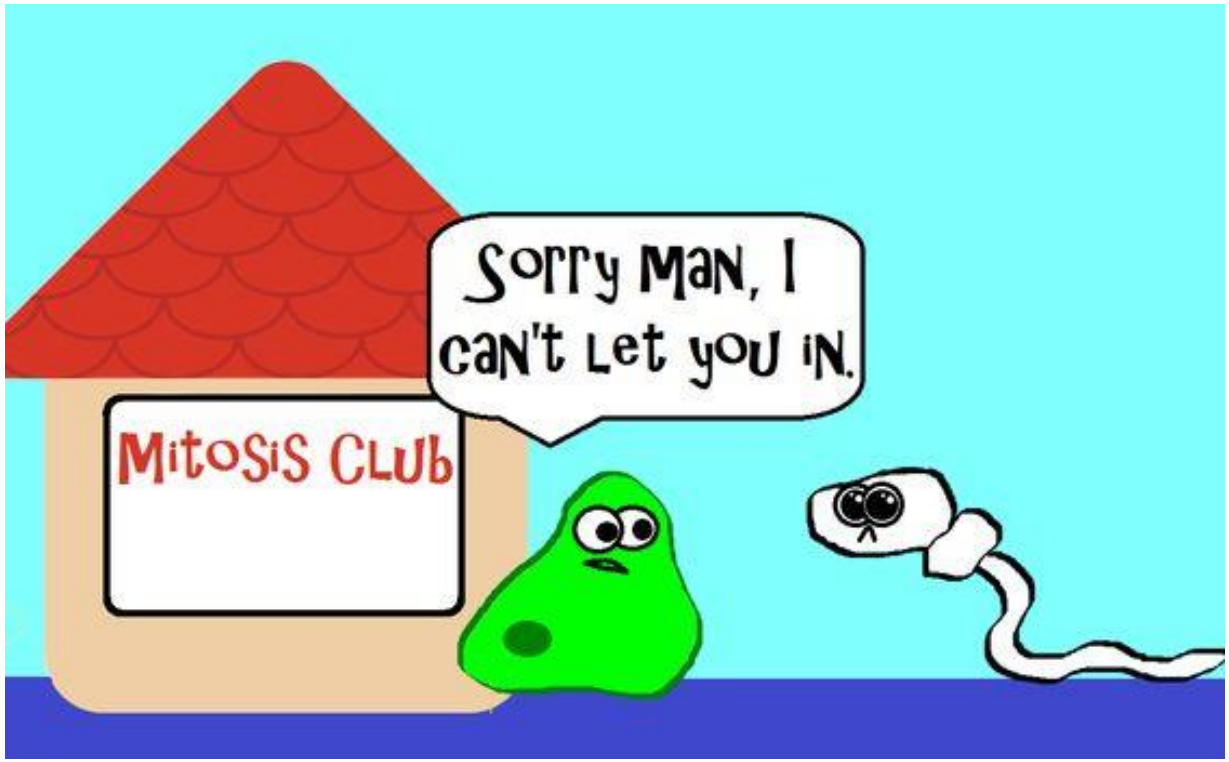
Which participate in mitosis?





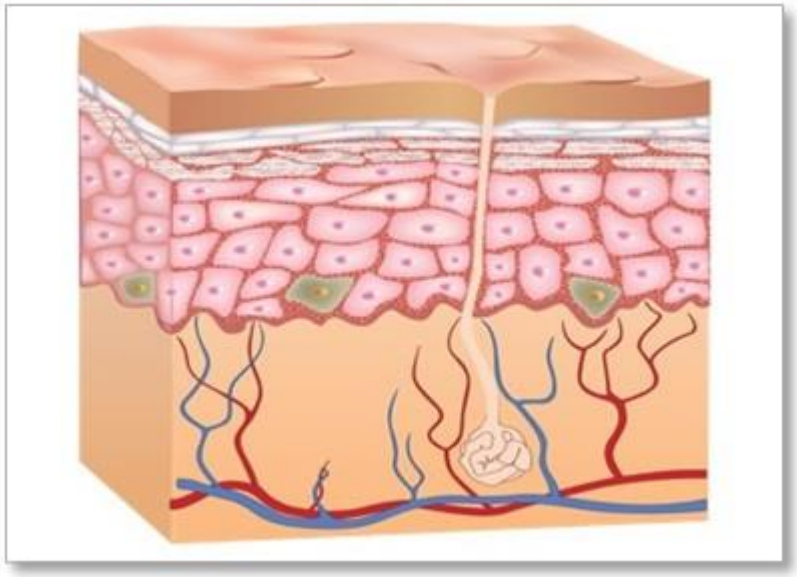
Which participate in mitosis?

- Somatic cells
- NOT sex cells



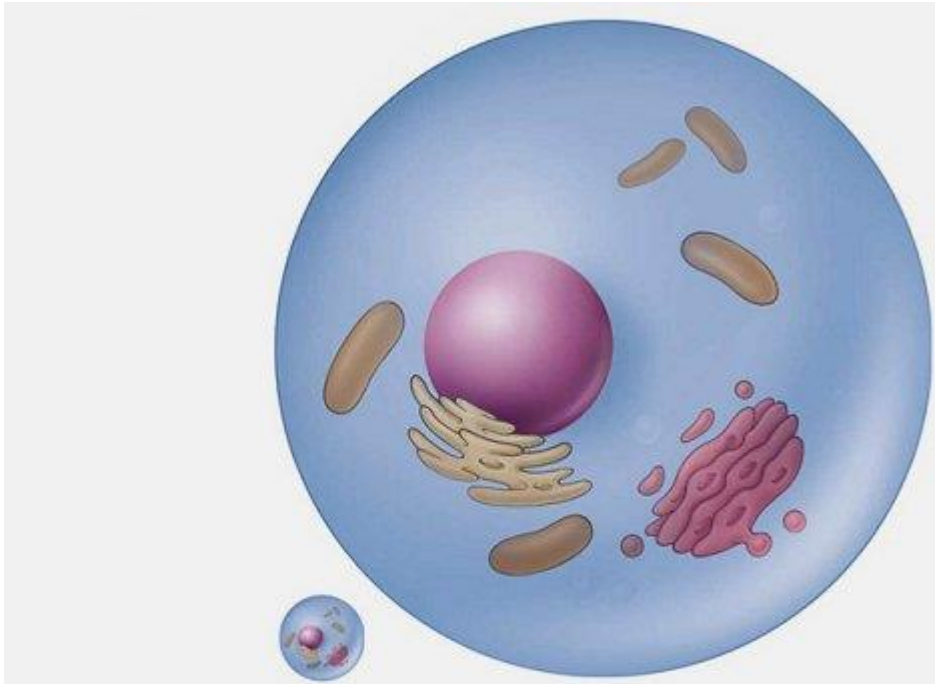
Why make new cells

- Growth
- Repair
- Maintenance



10-1 CELL GROWTH

- Why divide rather than grow?
  - High demand on DNA
  - Cell has difficulty moving
  - Difficult to get enough nutrients

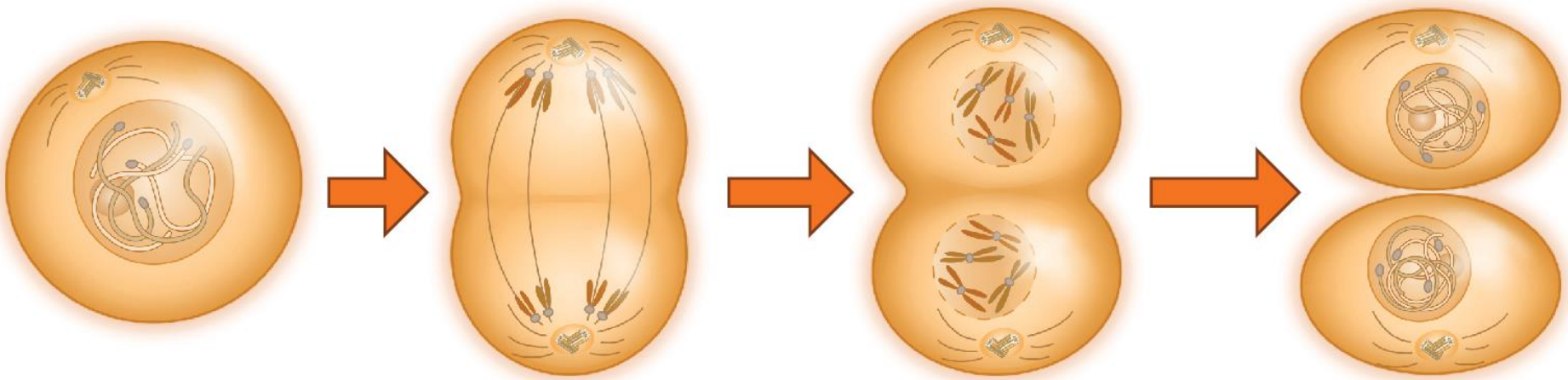


Cell radius (r)	1 unit	10 units
Surface area ($4\pi r^2$)	12.57 units^2	1,257 units^2
Volume ($\frac{4}{3}\pi r^3$)	4.189 units^3	4,189 units^3

10-1 DIVISION OF THE CELL

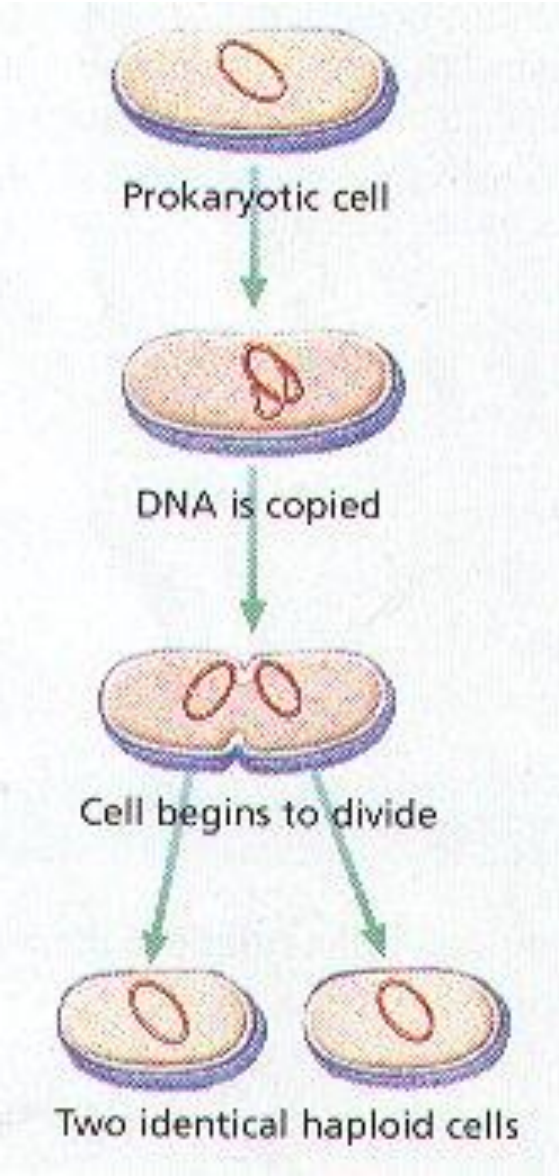
- Before the cell gets too big it will divide
- Two daughter cells are created
- Each one has the same DNA

Cell division



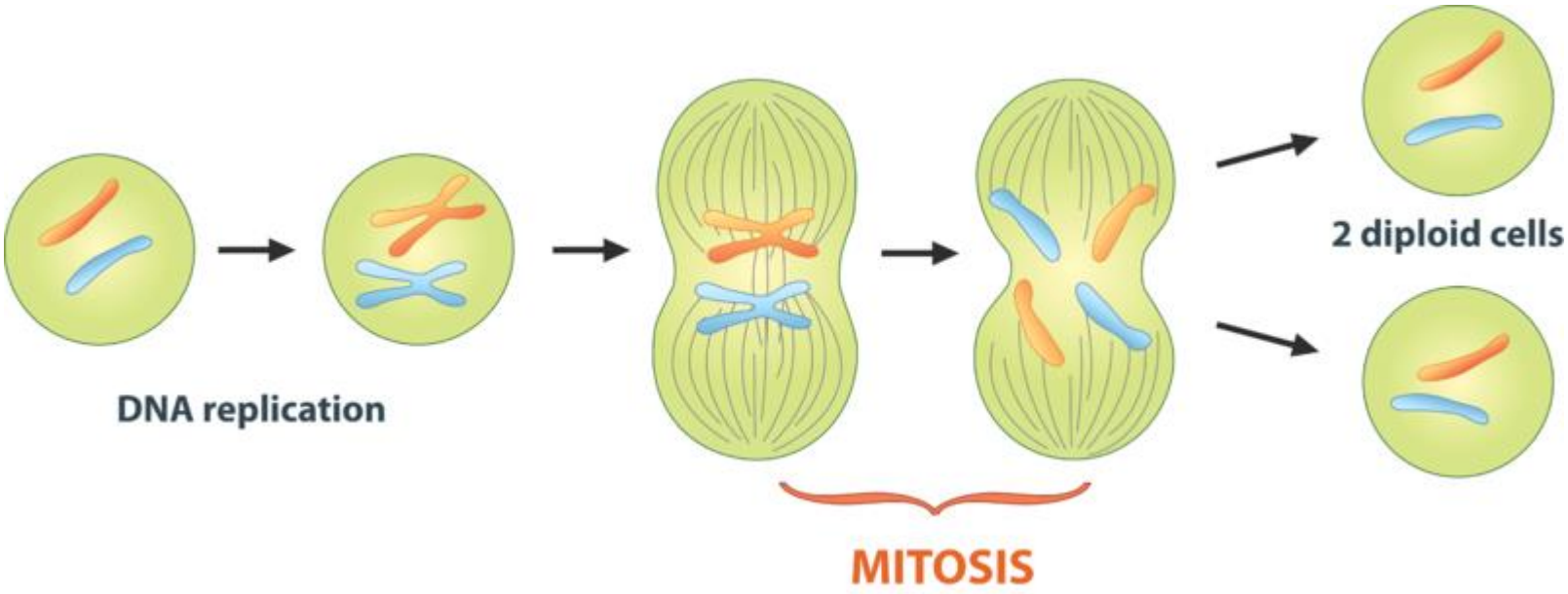
10-2 Cell Division

- Prokaryotic cell division
- DNA replicates
- Cell splits into two cells



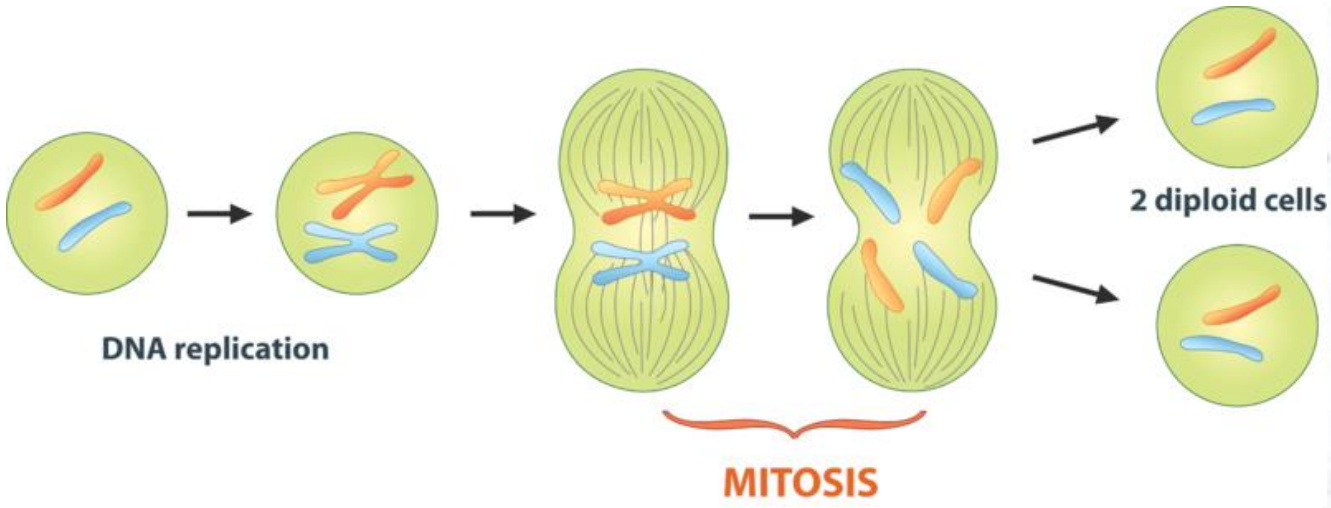
10-2 Cell Division

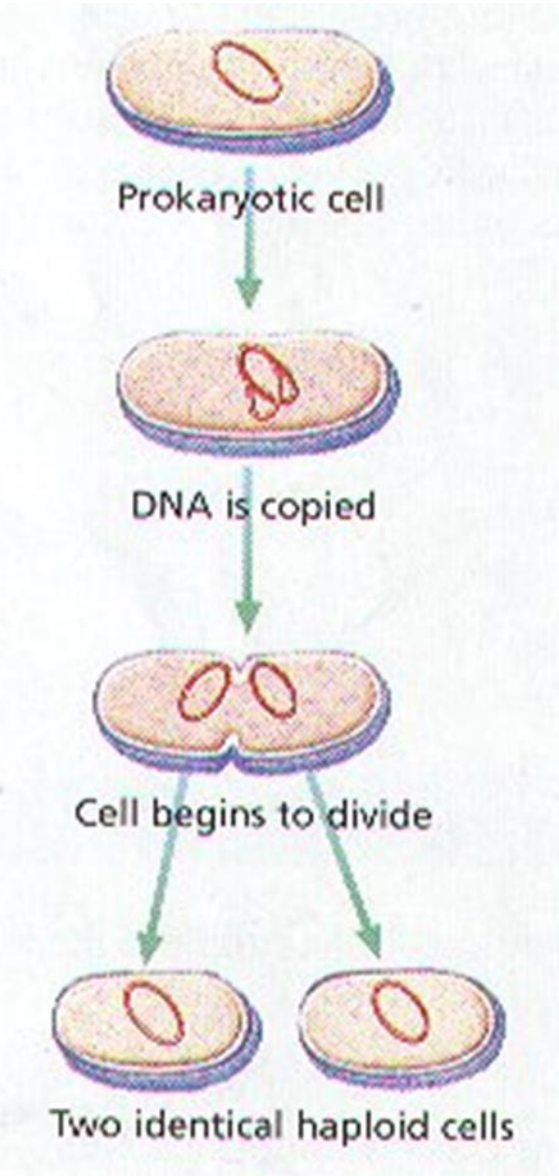
- Eukaryotes
  - Mitosis – DNA replicates
  - Cytokinesis – cell splits in two



10-2 Cell Division

- Prokaryotic
- Eukaryotes

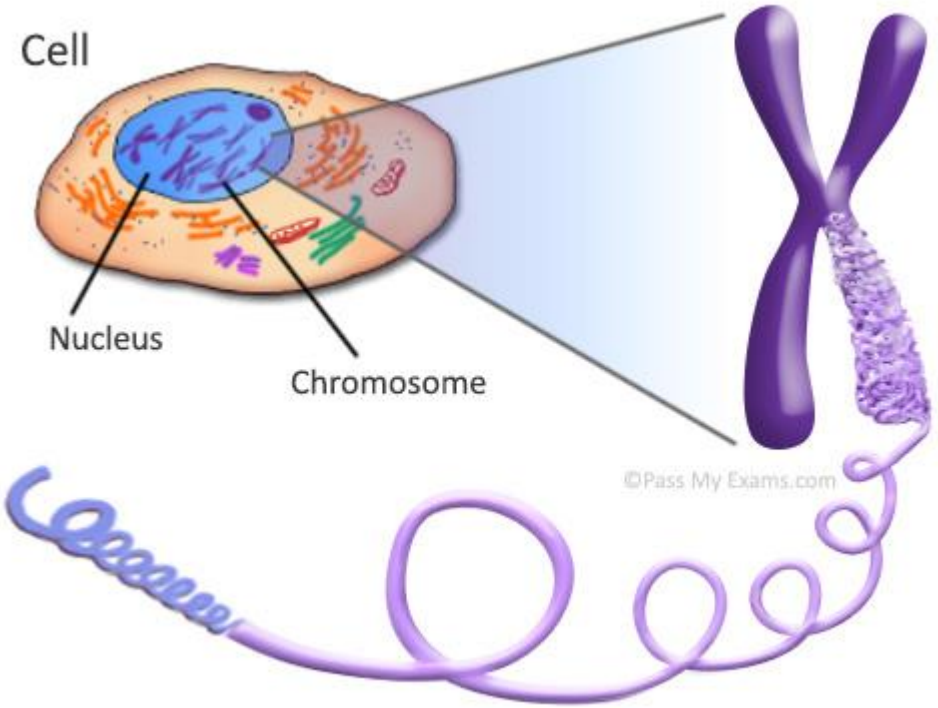




10-2 Cell Division

Chromosomes

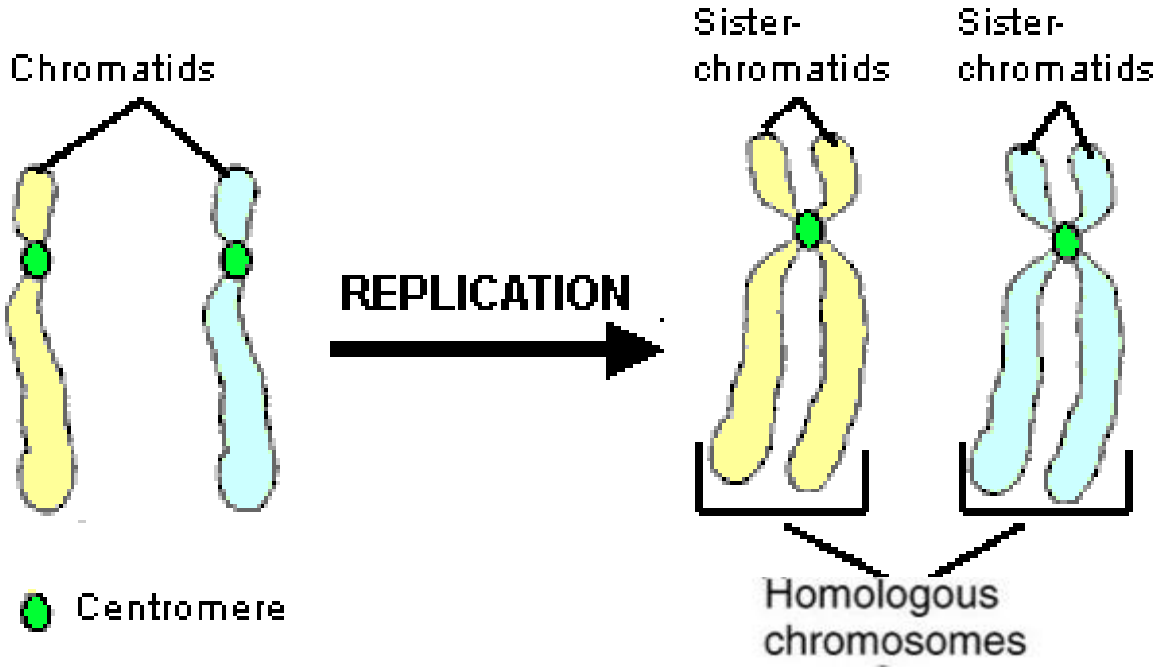
- Made of DNA
- Inside nucleus
- Humans have 46
  - Carrots have 18
  - Chicken 78



10-2 Cell Division

Chromosomes

- Chromatids – single
- Chromosome – double

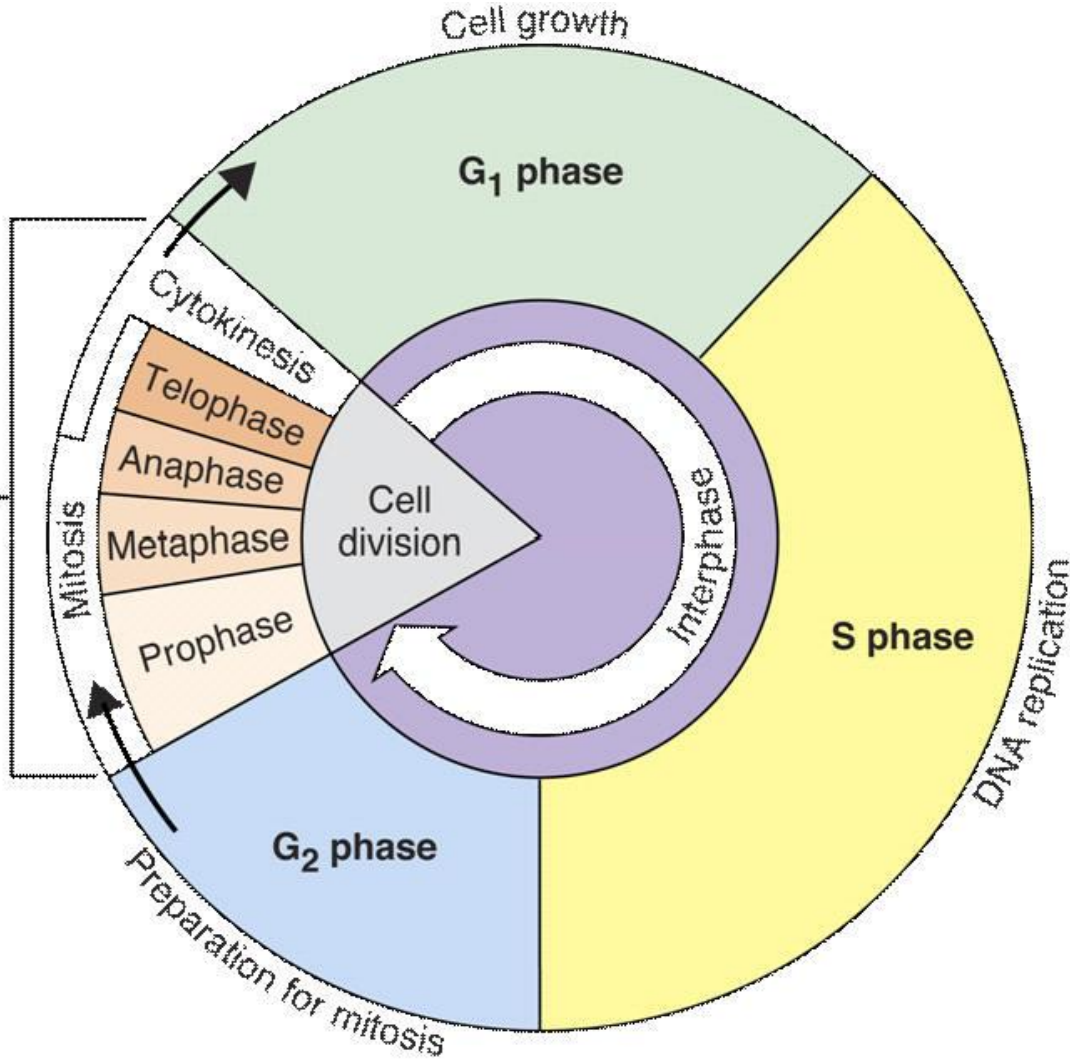


10-2 Cell Division

Cell cycle

- Cell grows
- Cell replicates DNA
- cell divides

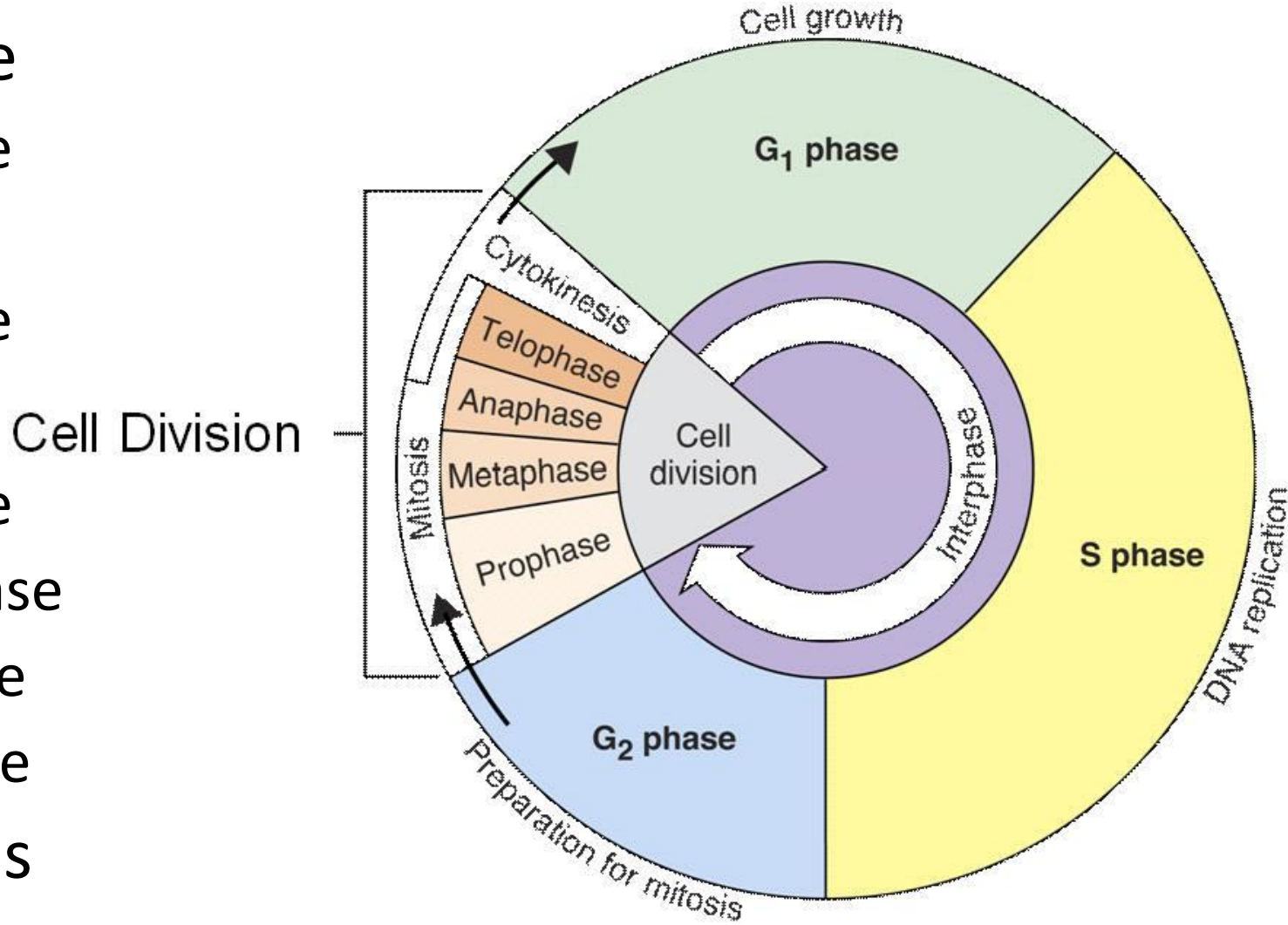
Cell Division



10-2 Cell Division

Cell cycle

- Interphase
  - G1 phase
  - S phase
  - G2 phase
- Mitosis
  - Prophase
  - Metaphase
  - Anaphase
  - Telophase
- Cytokinesis



Cell Division

10-2 Cell Division

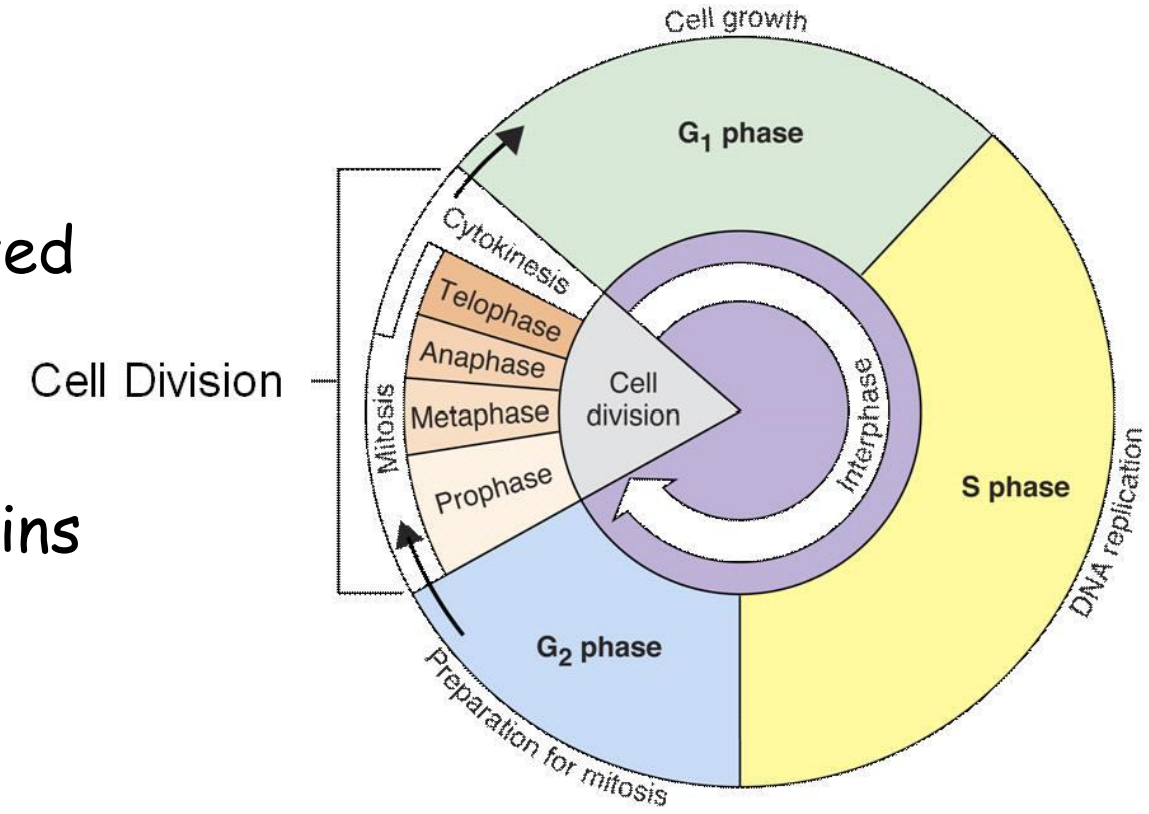
Cell cycle

Interphase

G1 – cell grows in size
– organelles replicated

S – replication of DNA
– synthesis of proteins associated with DNA

G2 – synthesis of proteins associated with mitosis



10-2 Cell Division

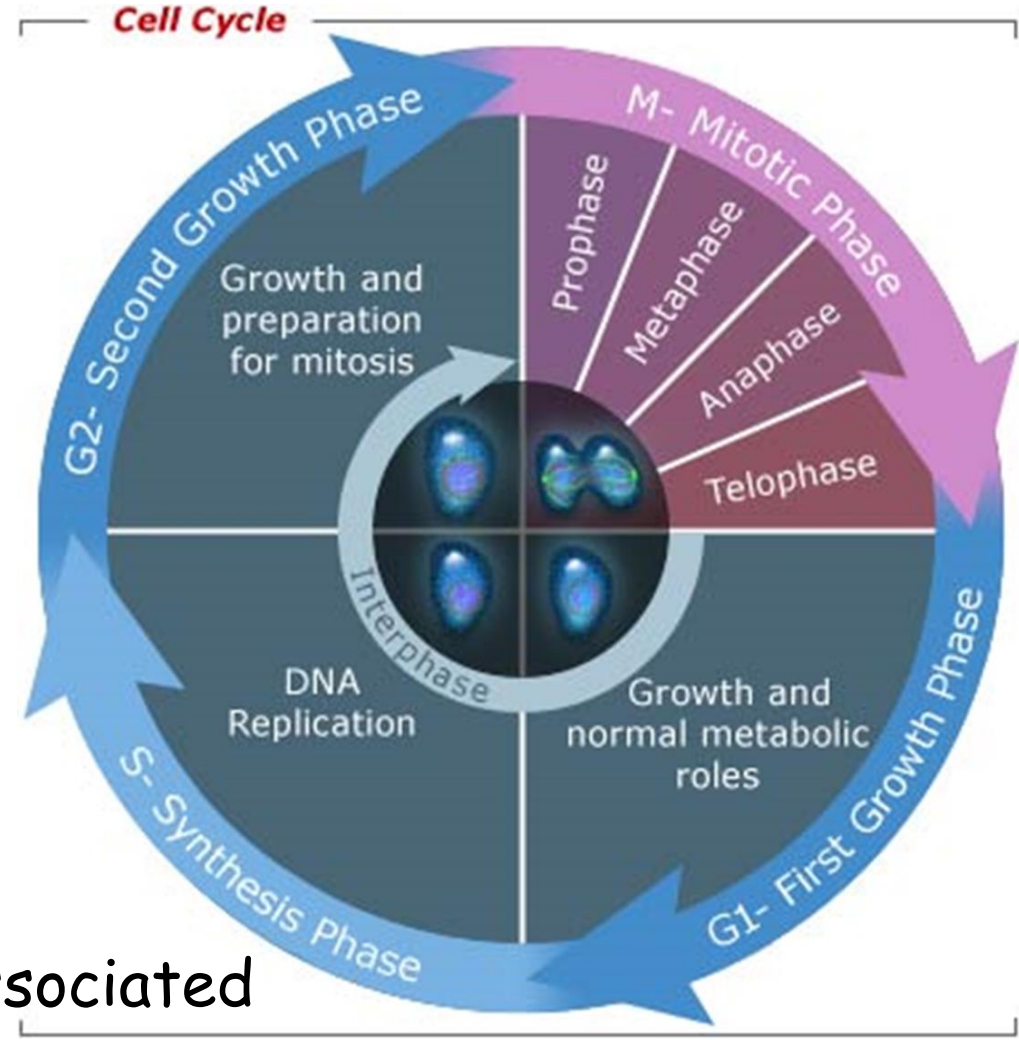
Cell cycle

Interphase

G1 – cell grows in size
– organelles replicated

S – replication of DNA
– synthesis of proteins associated with DNA

G2 – synthesis of proteins associated with mitosis

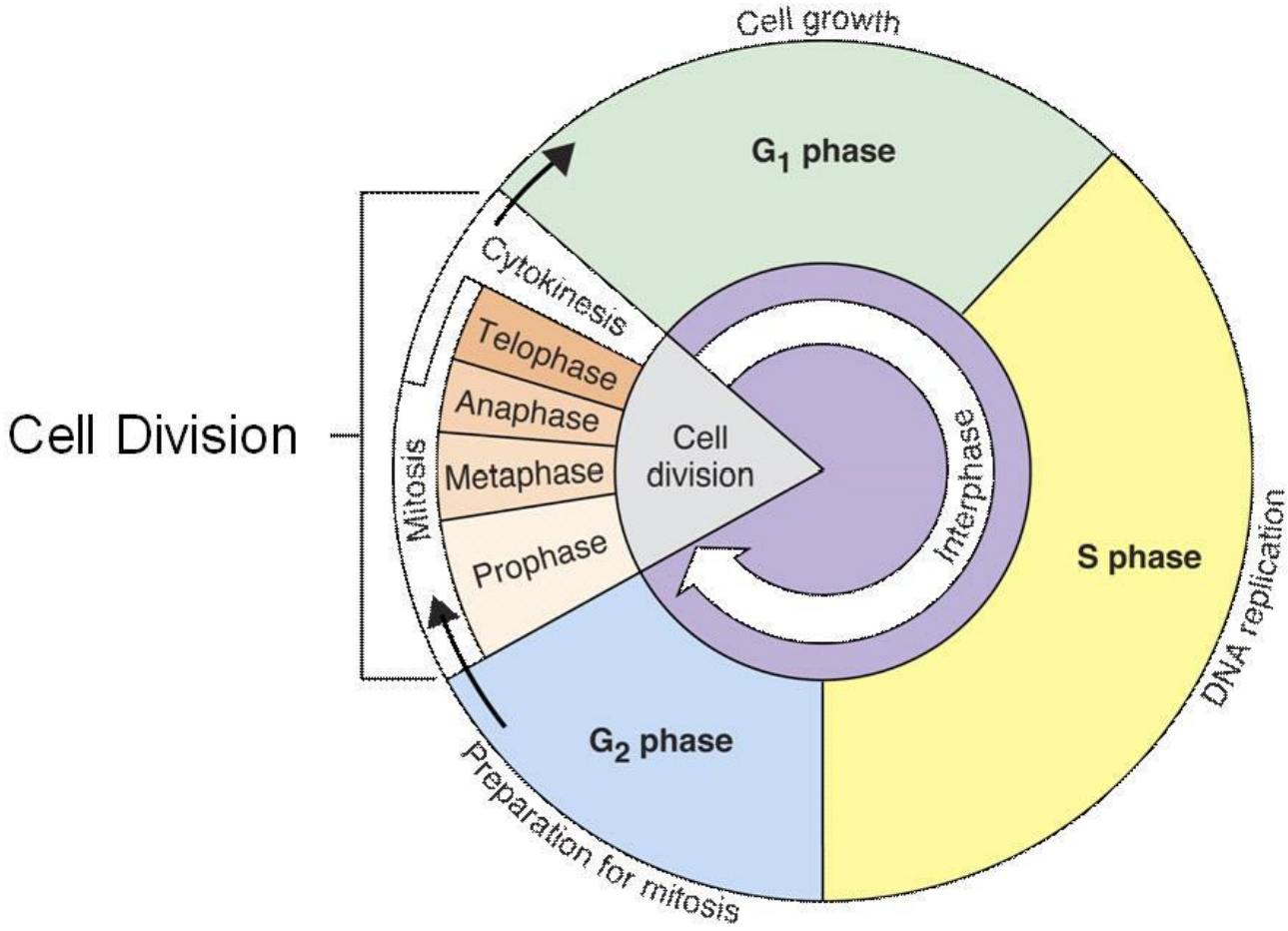


10-2 Cell Division

Cell cycle

Mitosis

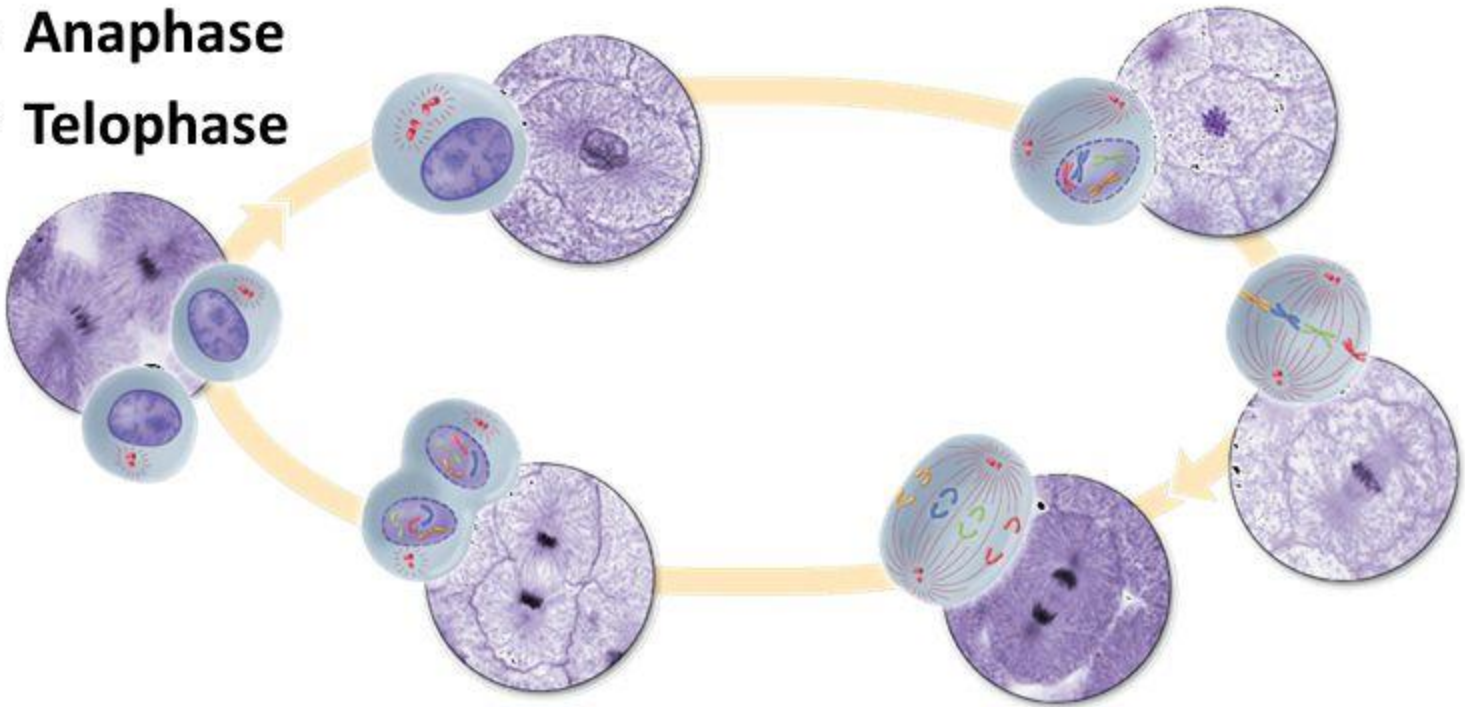
- Prophase
- Metaphase
- Anaphase
- Telophase



Mitosis

Biologists divide the events of mitosis into four phases: (PMAT)

- **Prophase**
- **Metaphase**
- **Anaphase**
- **Telophase**

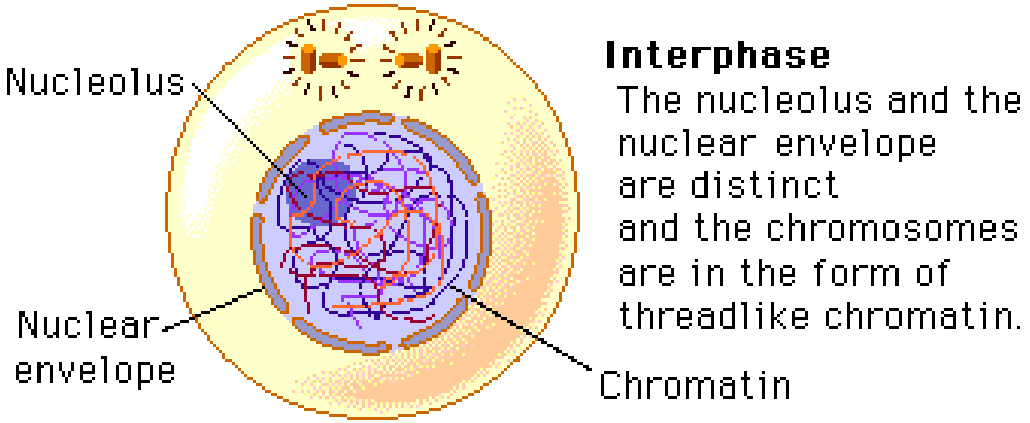


10-2 Cell Division

Cell cycle

Mitosis – Interphase

- Cell grows and replicates DNA
  - G1
  - S
  - G2

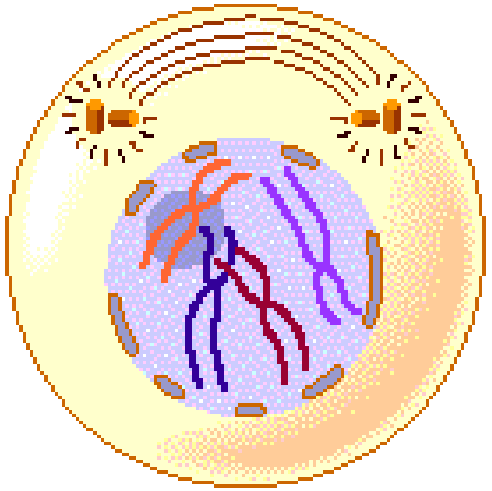


10-2 Cell Division

Cell cycle

Mitosis – Prophase

- Chromatin condenses into chromosome
- Centrioles separate
- Spindle fibers form
- Nucleus starts to break down



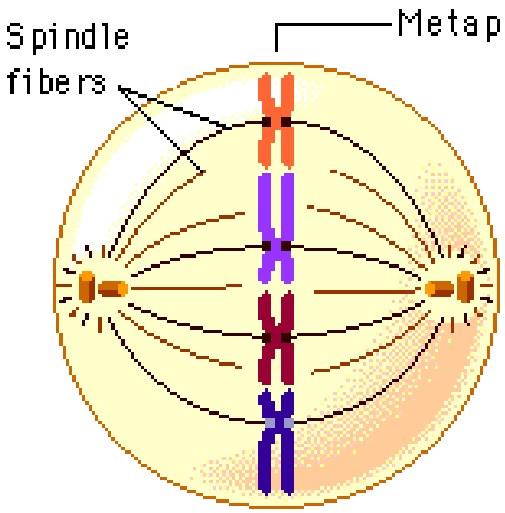
Prophase
The chromosomes appear condensed, and the nuclear envelope is not apparent.

10-2 Cell Division

Cell cycle

Mitosis – Metaphase

- Chromosomes line up in middle
- Spindle fibers connect to centriomeres



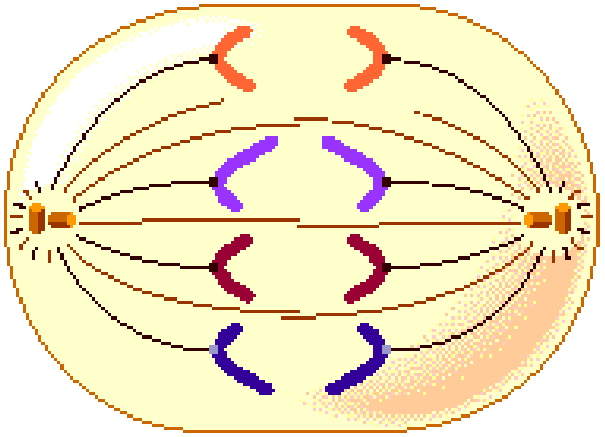
Metaphase
Thick, coiled chromosomes are lined up in the center of the cell on the metaphase plate. Spindle fibers are attached to the chromosomes.

10-2 Cell Division

Cell cycle

Mitosis – Anaphase

- Chromosomes are pulled away



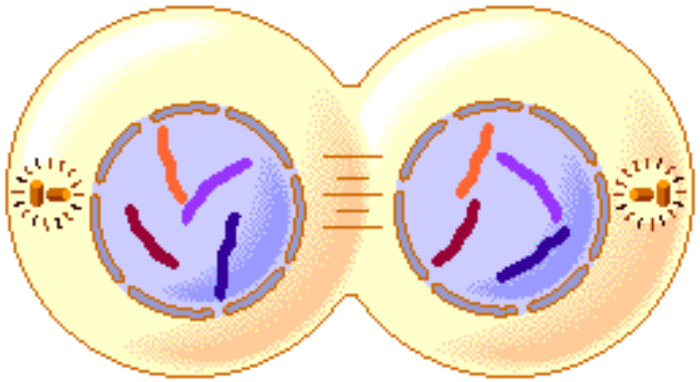
Anaphase
The chromosomes have separated and are moving toward the poles.

10-2 Cell Division

Cell cycle

Mitosis – Telophase

- Two nuclei formed



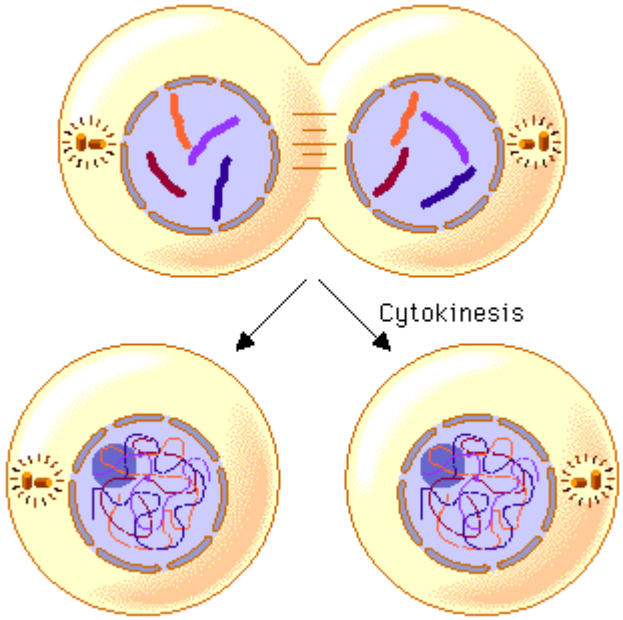
Telophase
The chromosomes are at the poles, and are becoming more difuse. The nuclear envelope is reforming. The cytoplasm may be dividing.

10-2 Cell Division

Cell cycle

Cytokinesis

- Cell splits into two separate cells
- Each daughter cells has identical DNA



10-2 Cell Division

Cell cycle

Cytokinesis

- Cell splits into two separate cells
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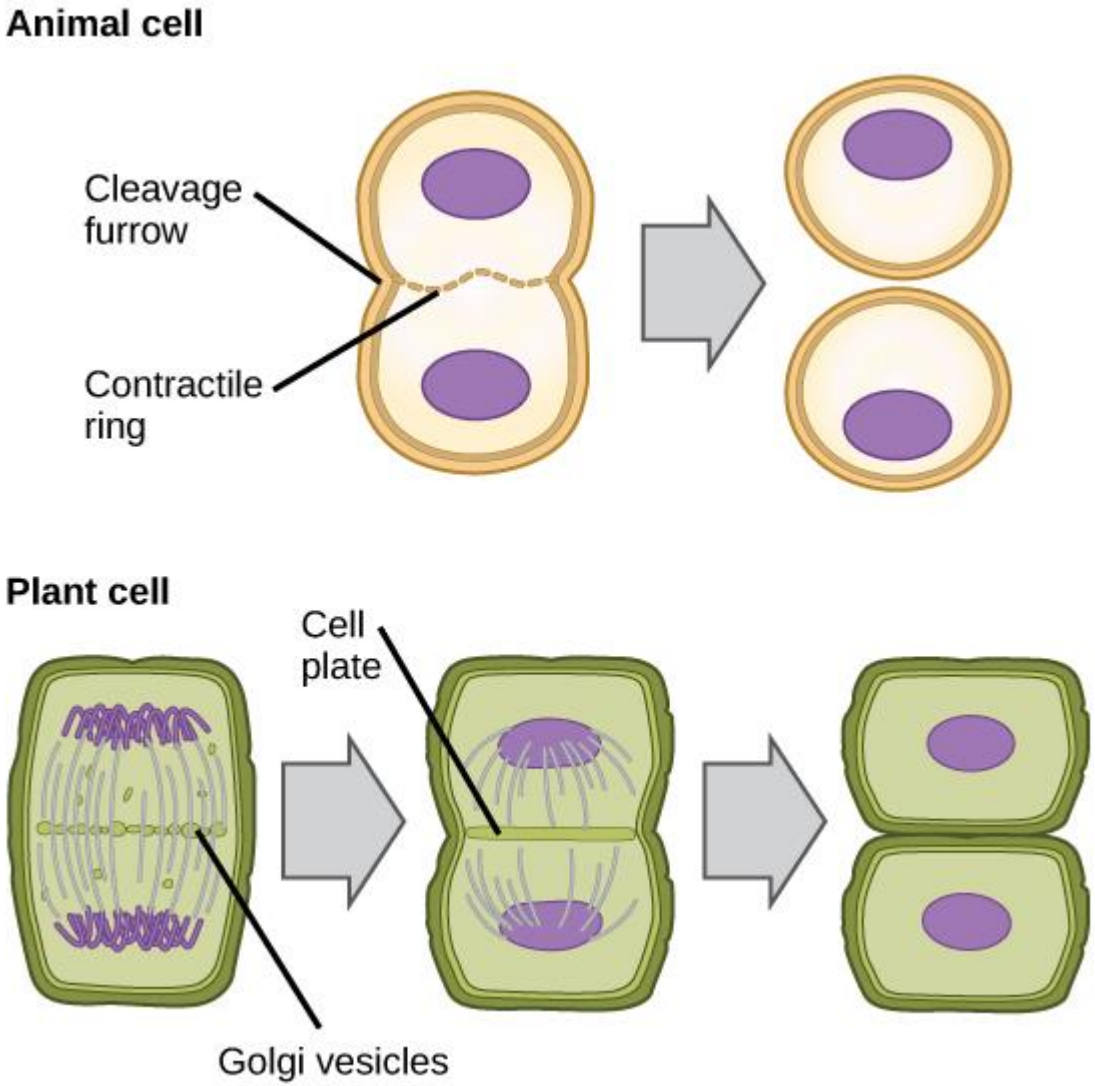
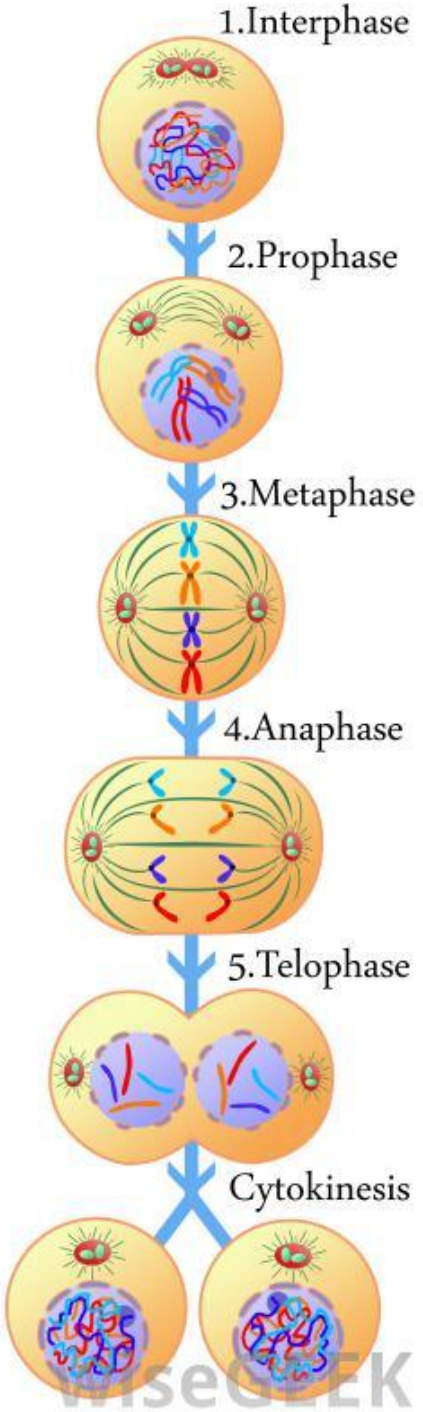


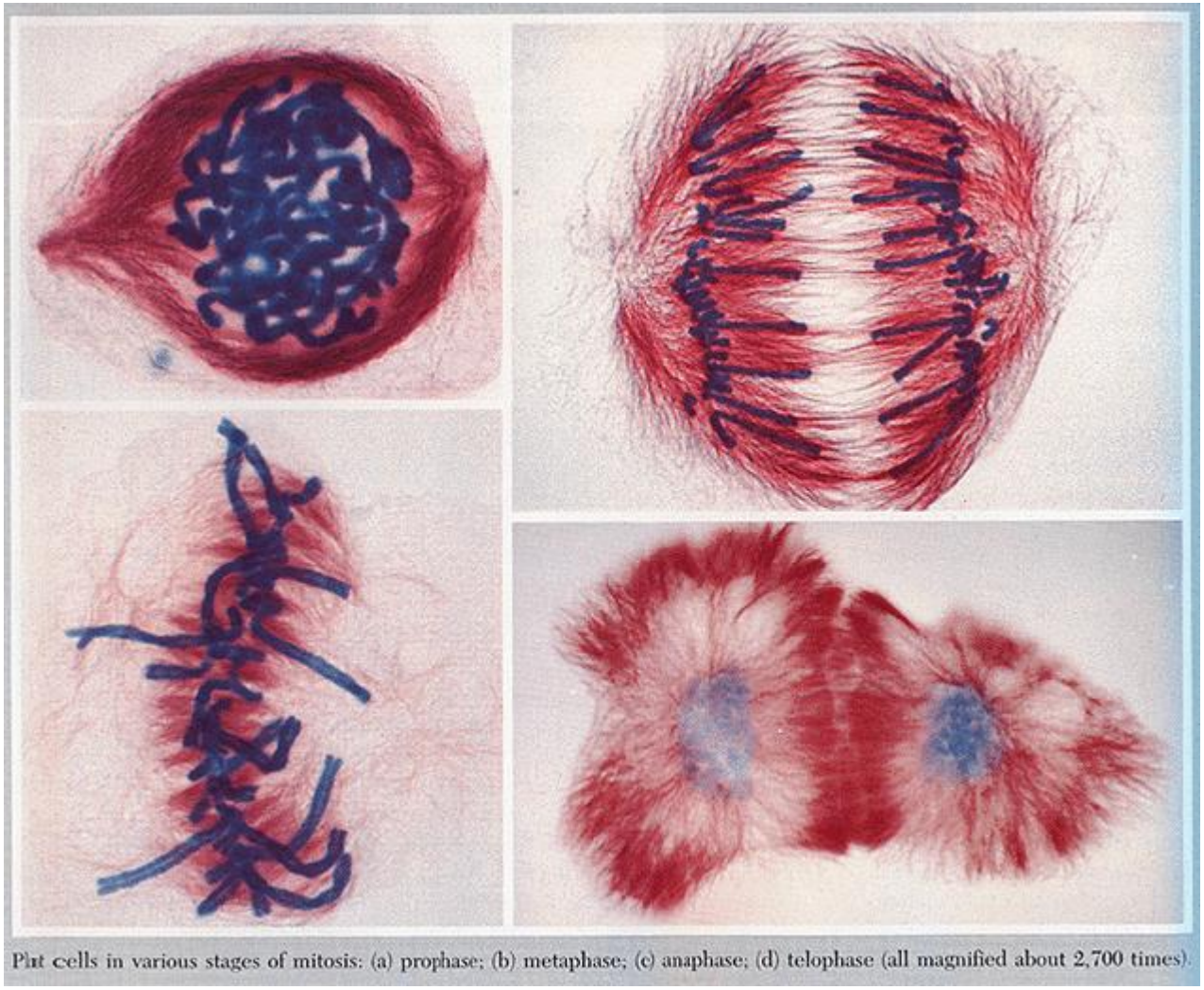
10-2 Cell Division

Cell division of somatic cells

- Interphase
  - G1 phase - growth
  - S Phase – DNA replication
  - G2 Phase – Prepares for division
- Mitosis
  - Prophase – Chromosomes condense
  - Metaphase – chromosomes in middle
  - Anaphase – Chromosomes move away
  - Telophase – two nucleus formed
- Cytokinesis – two separate cells

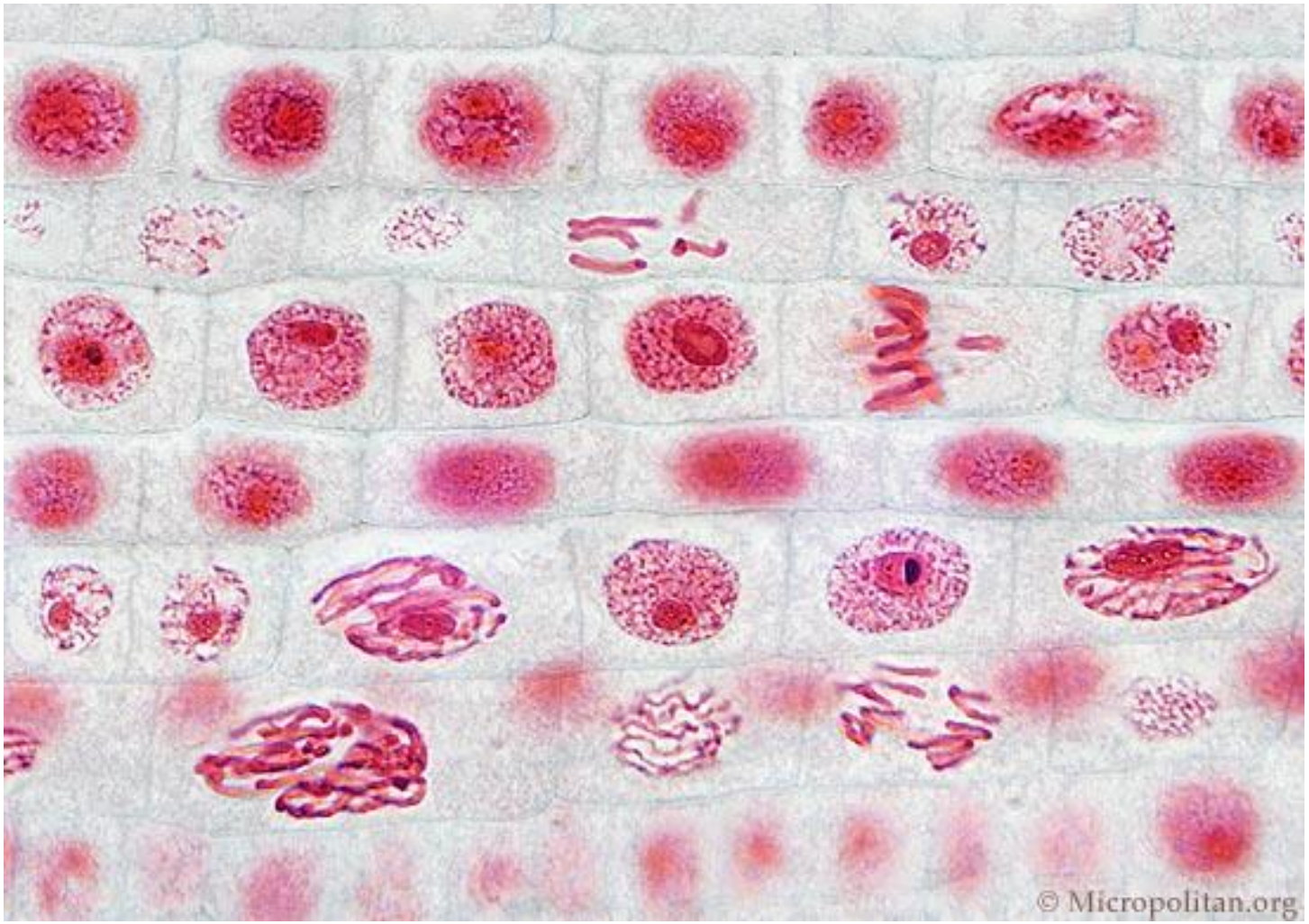


10-2 Cell Division

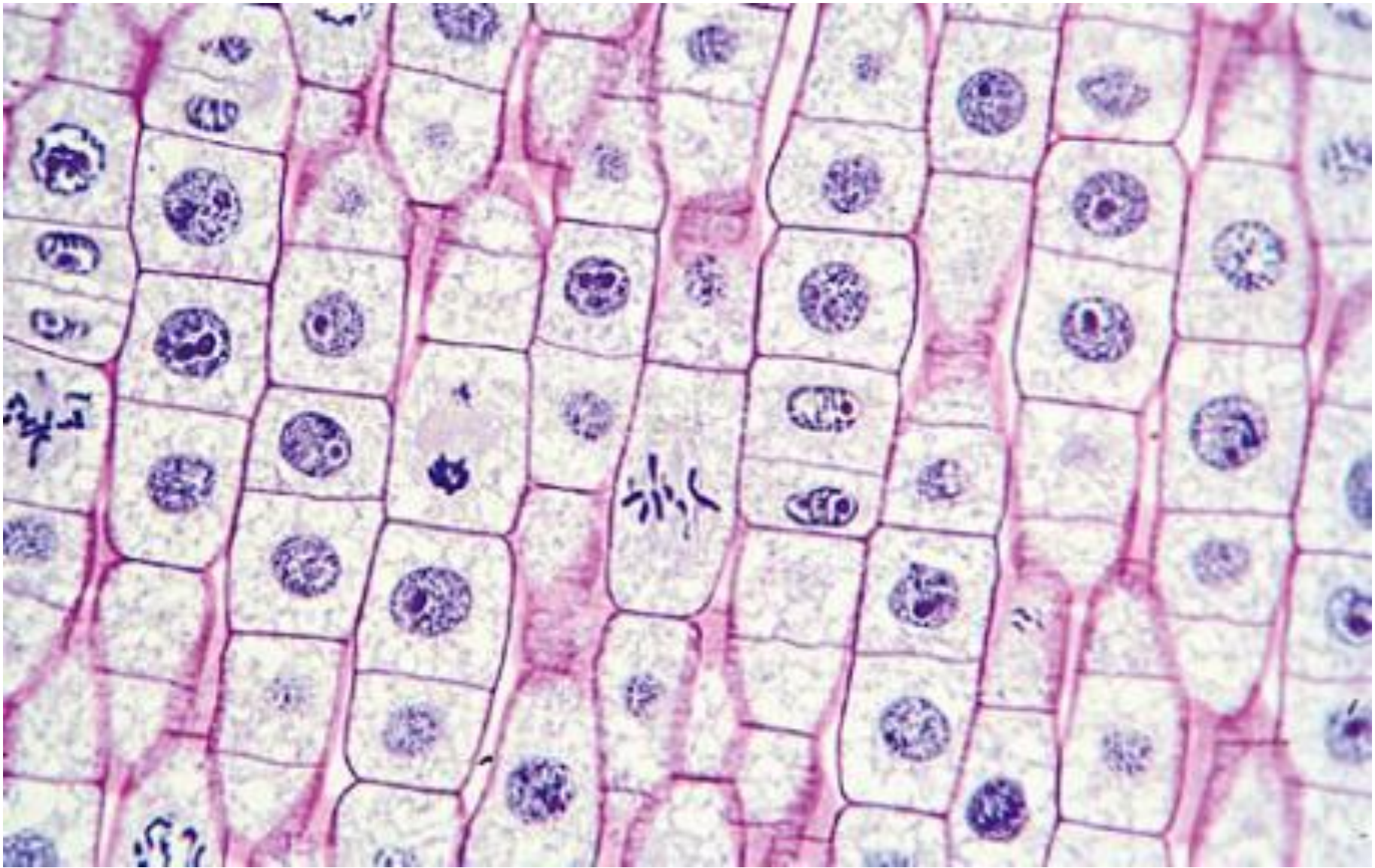


Plant cells in various stages of mitosis: (a) prophase; (b) metaphase; (c) anaphase; (d) telophase (all magnified about 2,700 times).

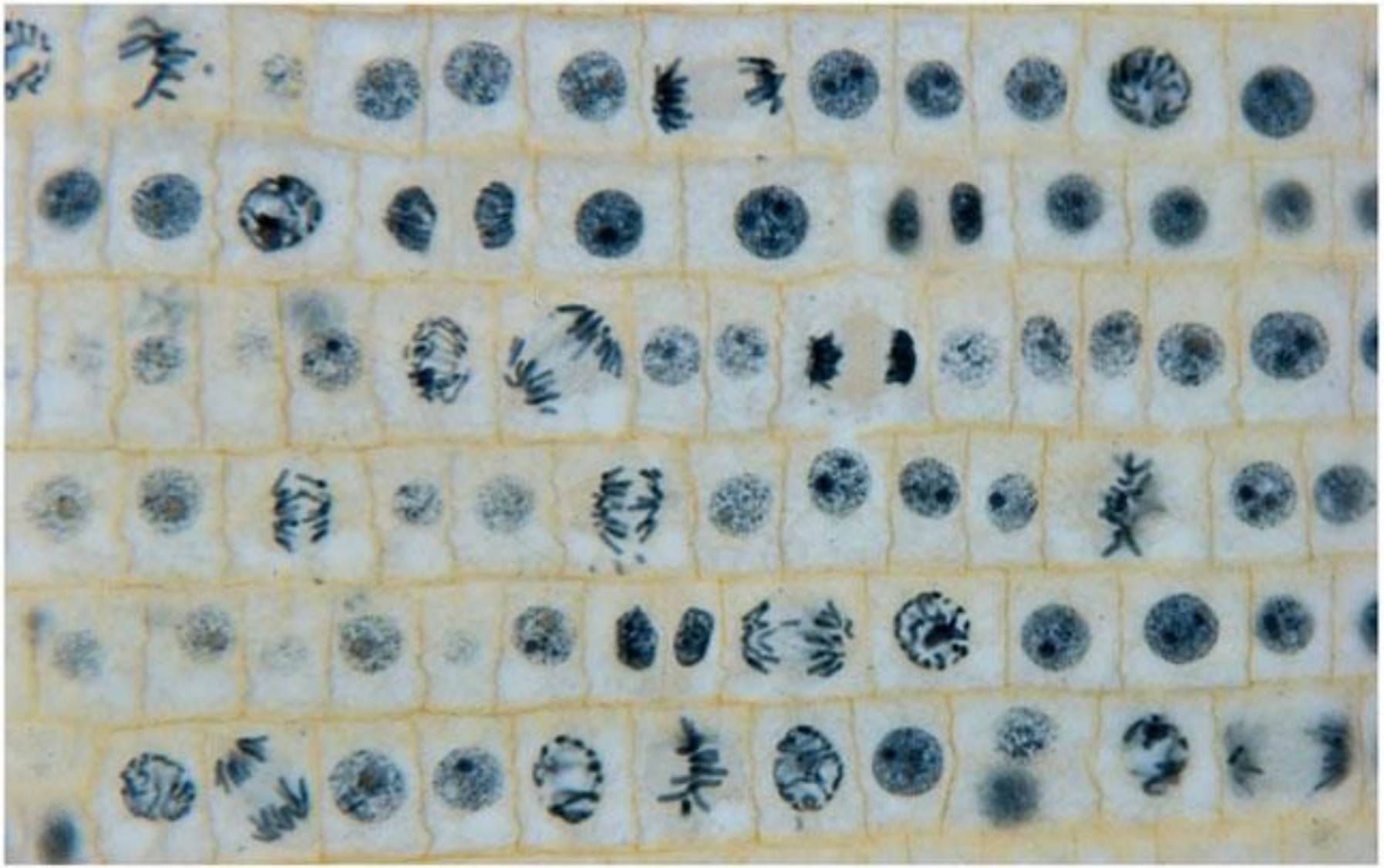
10-2 Cell Division

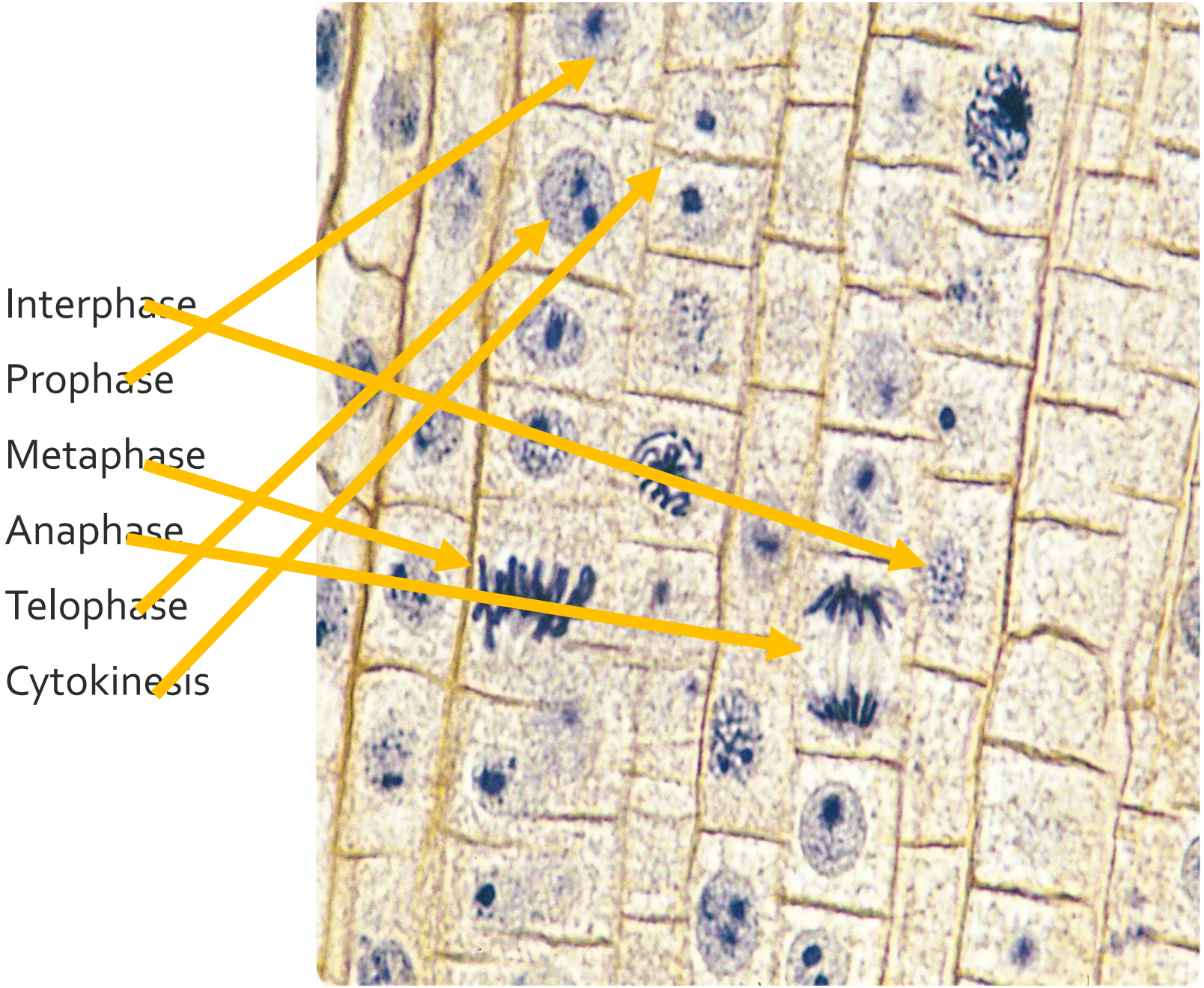


10-2 Cell Division



10-2 Cell Division




Interphase
Prophase
Metaphase
Anaphase
Telophase
Cytokinesis

- https://www.youtube.com/watch?v=lpAa4TWjHQ4
- https://www.youtube.com/watch?v=gwcwSZIfKlM