

# Cell Division

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# Cell Division

- \* 100 trillion cells that make up your body began from a single fertilized egg
- \* Example: red blood cells die and are replaced at a rate of one million every second

# Why do cells divide?

## \* Healing and Tissue Repair

- \* An average human loses 105 pounds of dead skin cells in their life

## \* Growth

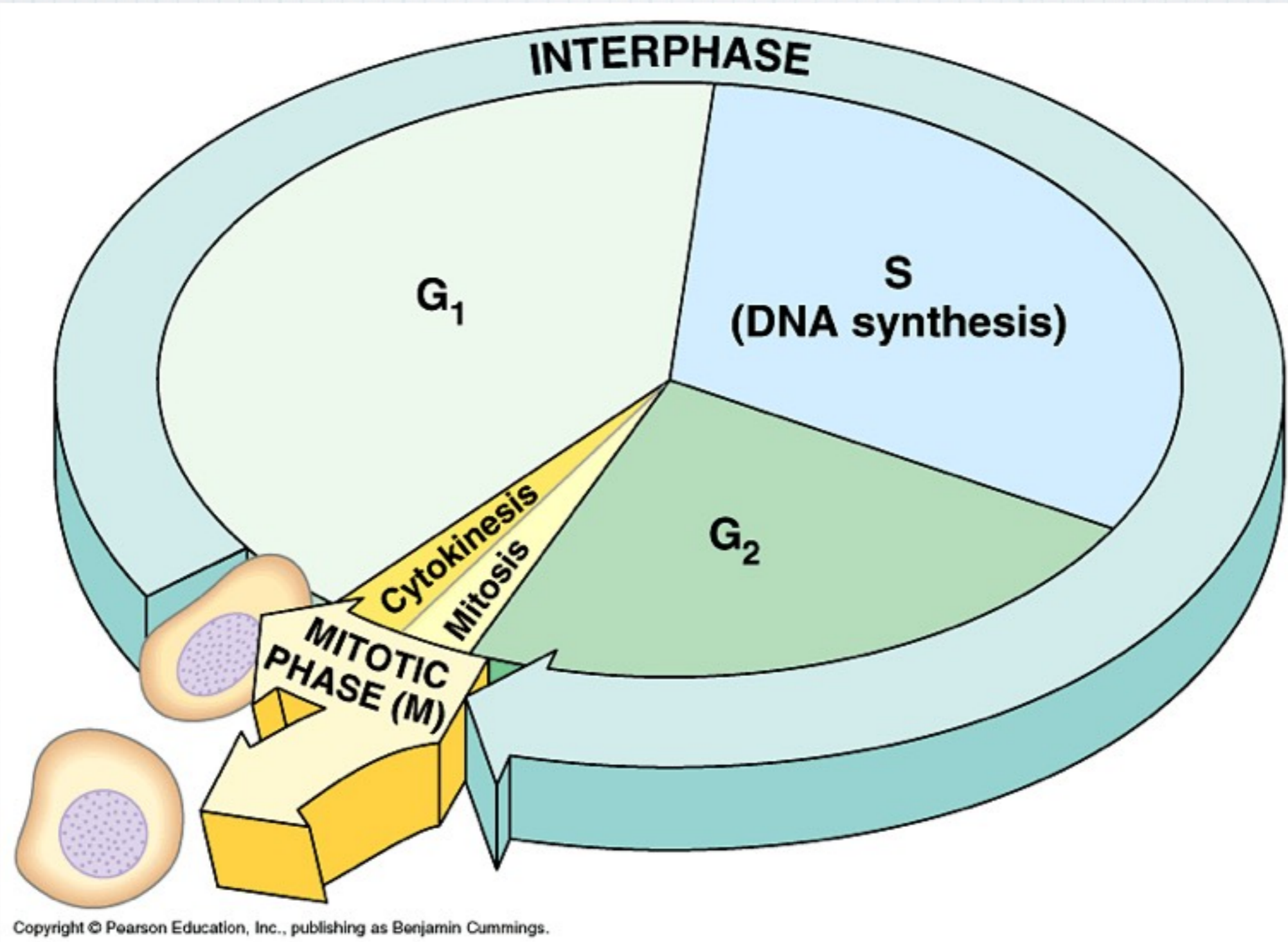
- \* All plants and animals begin life as a single cell

## \* Perpetuate Life

- \* Create new organisms in unicellular organisms (Fission)
- \* Creating gametes in multicellular organisms

# The Cell Cycle

- \* A continuous process
- \* The circle represents the entire life cycle of the cell, which can be divided into two major phases:
  - \* interphase
  - \* cell division phase
- \* Most cells spend the majority of their time in interphase.



# Interphase

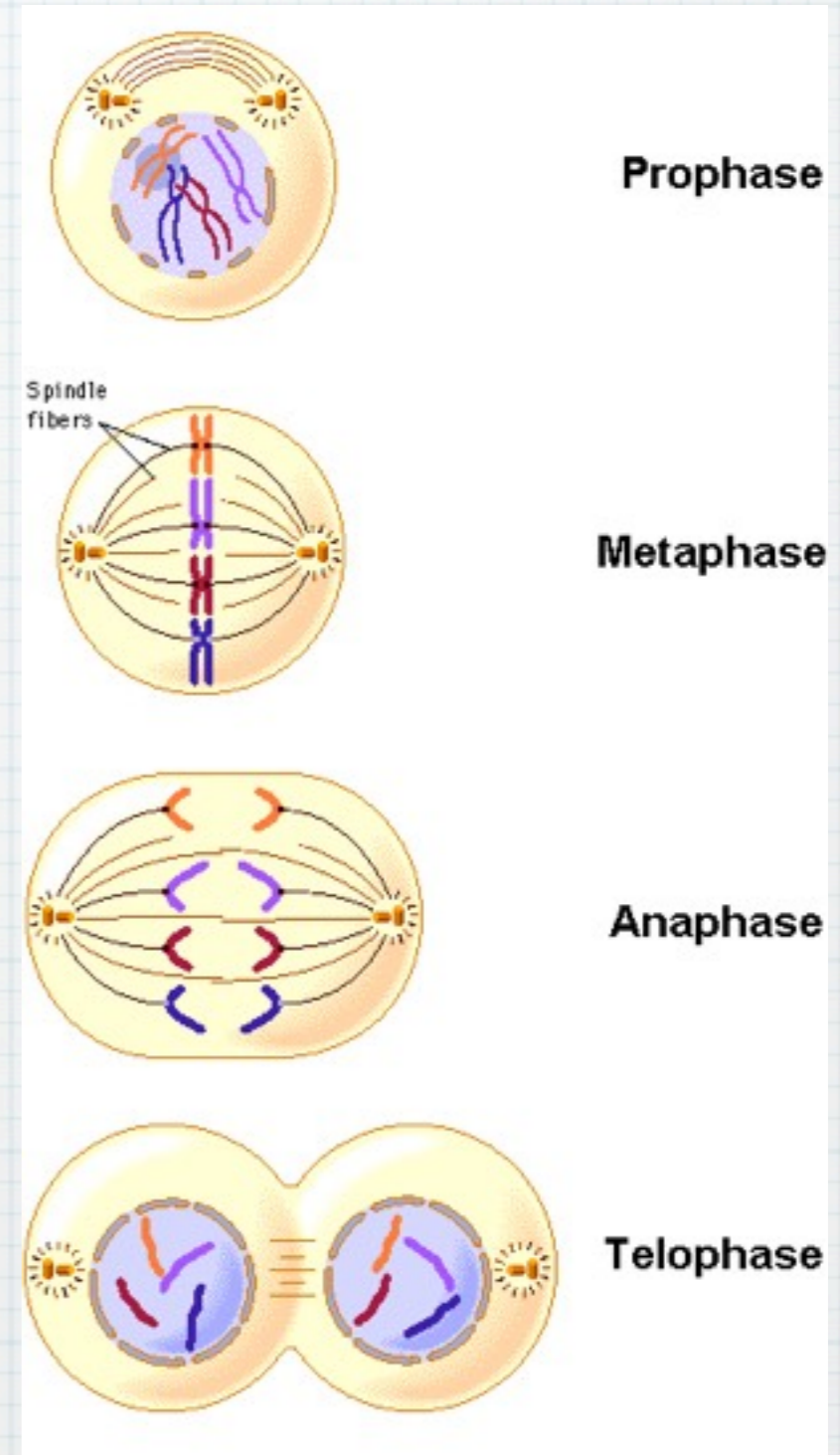
- \* Interphase: the period in the cell cycle during which the cell grows, matures, and duplicates genetic information.
- \* During interphase:
  - \* cells grow
  - \* DNA duplicated

# Interphase

- \* **First Growth Phase (G1)**
  - \* Period of growth for a cell
  - \* Produces new proteins and organelles
- \* **Synthesis Phase (S)**
  - \* Cell synthesizes entire copy of DNA
- \* **Second Growth Phase (G2) – shortest phase**
  - \* Cell produces organelles and structures for cell

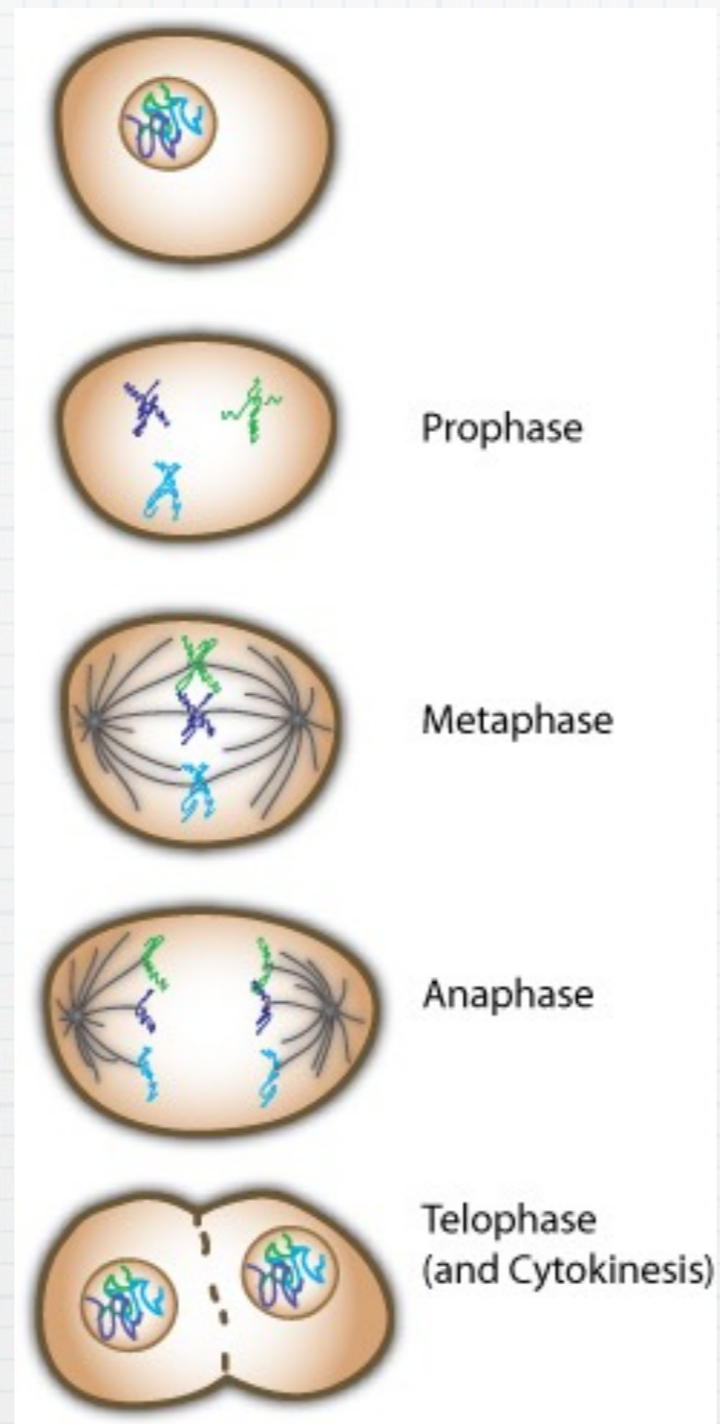
# Mitosis

- \* Mitosis: a type of cell division in which a daughter cell receives the same number of chromosomes as the parent cell



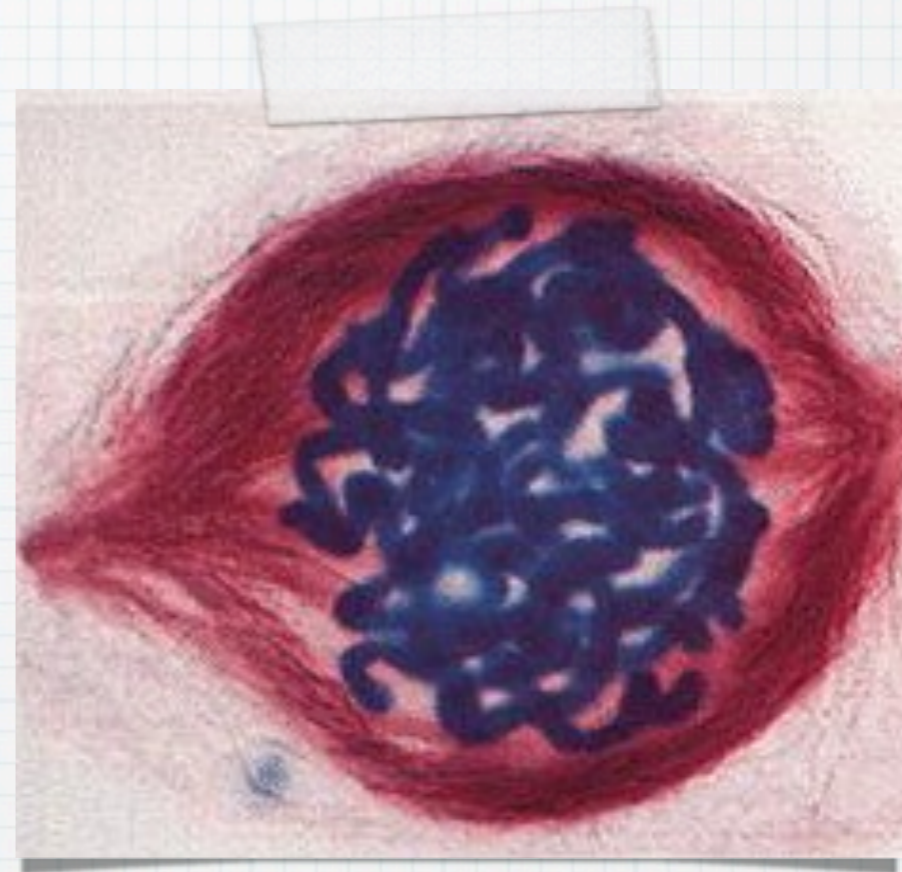


- **I**nterphase
- **P**rophase
- **M**etaphase
- **A**naphase
- **T**elophase
- **C**ytokinesis



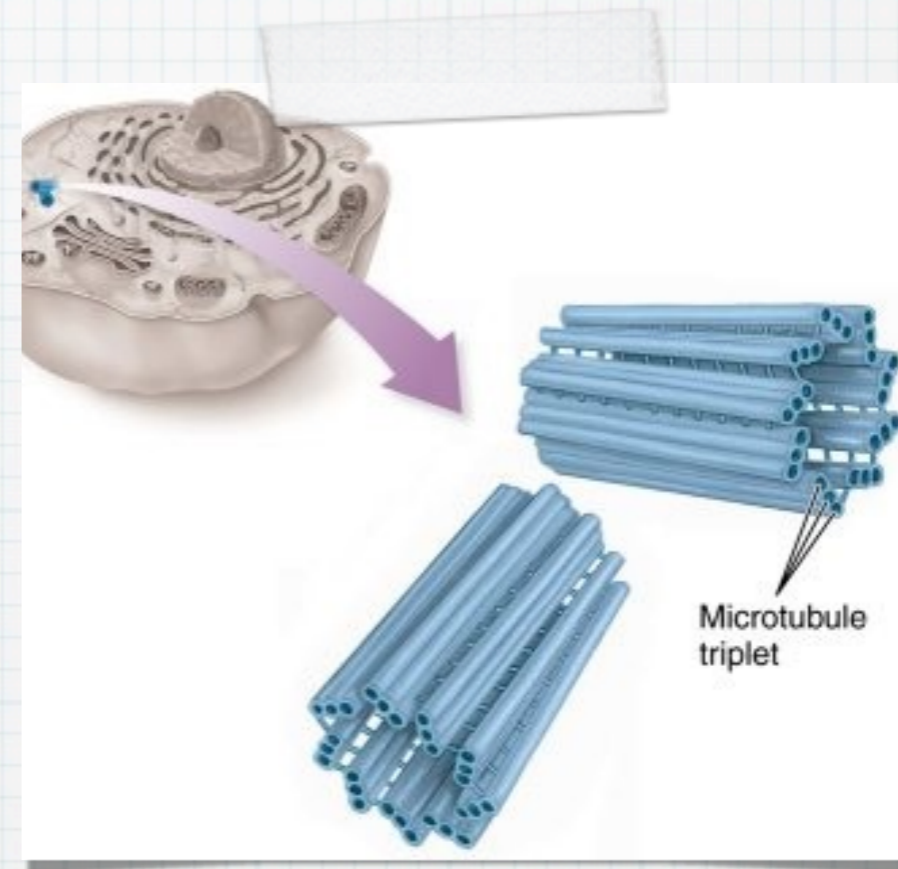
# Prophase

- \* Prophase:
- \* Chromosomes condense
- \* Nuclear envelope breaks down
- \* Centrioles move to opposite poles



# Prophase

- \* Centrioles: small protein tubes that organize the movement of chromosomes during cell division
- \* Spindle fibers: protein structures that guide chromosomes during cell division
- \* Centromere: the structure that holds chromatids together



# Chromosomes vs Chromatin

## \* Chromosomes

- \* Tightly packed
- \* Found only during division
- \* DNA not used for protein synthesis

## \* Chromatin

- \* Unwound DNA
- \* Found in interphase
- \* Used for protein synthesis

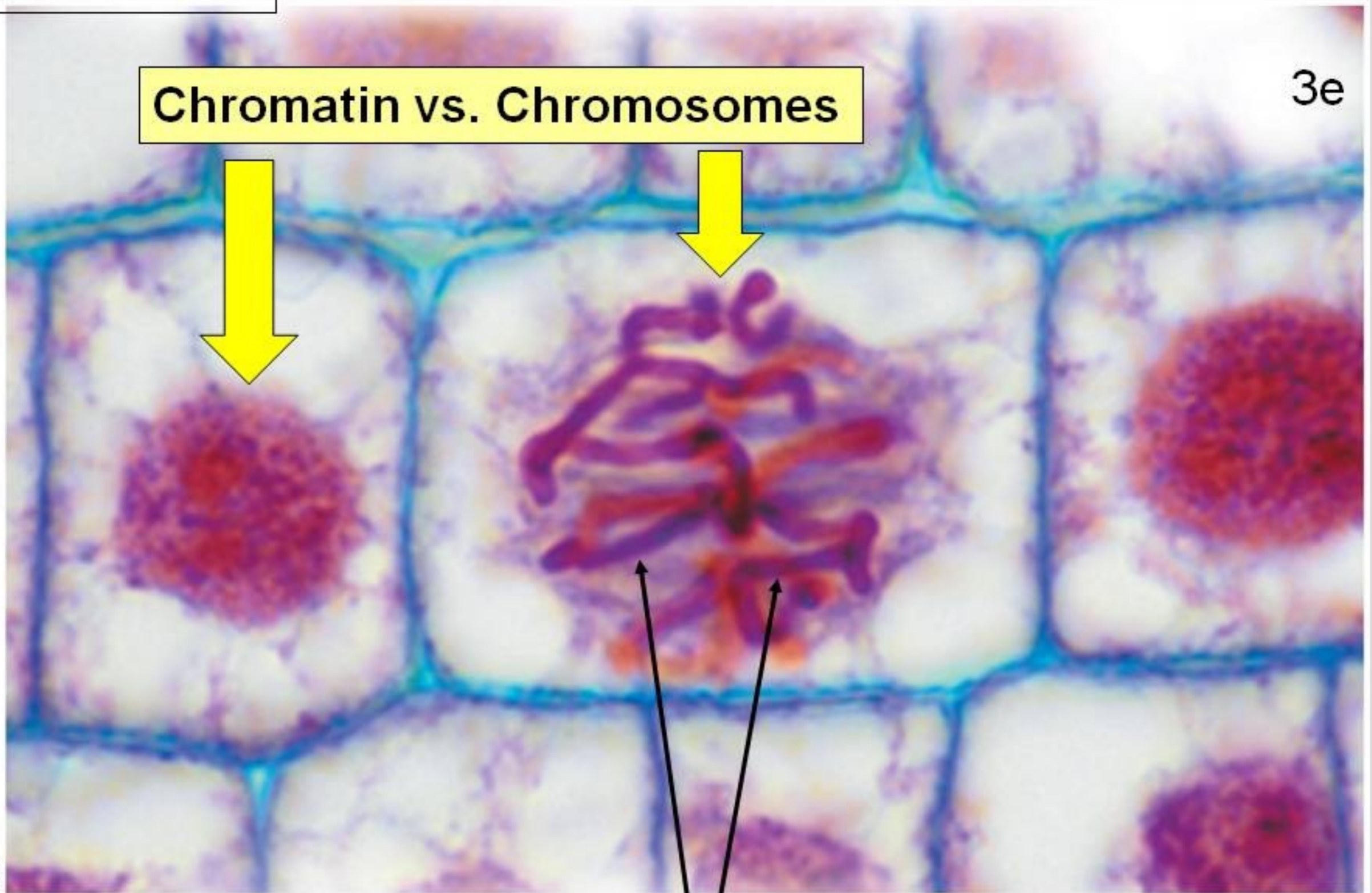
Fig. 8-3

# Chromatin vs. Chromosomes

3e

LM

Chromosomes



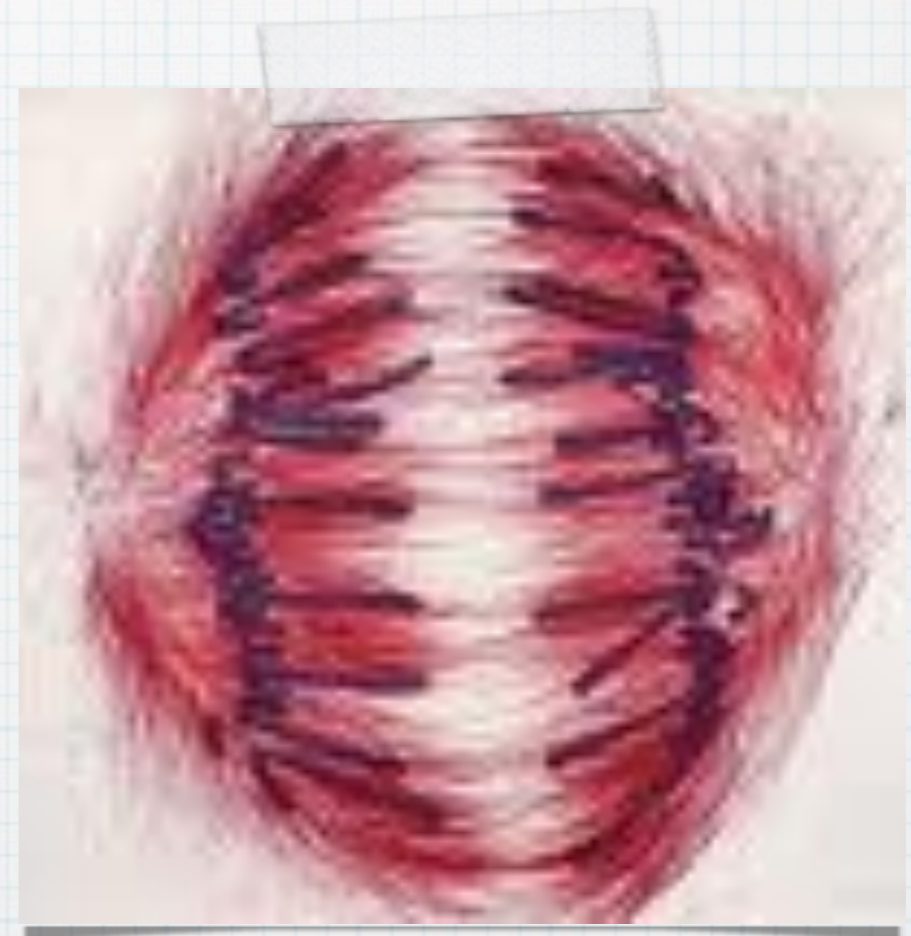
# Metaphase

- \* Metaphase - the chromosomes line up along the center axis of the cell.
- \* Guided by the spindle fibers extending from the centrioles



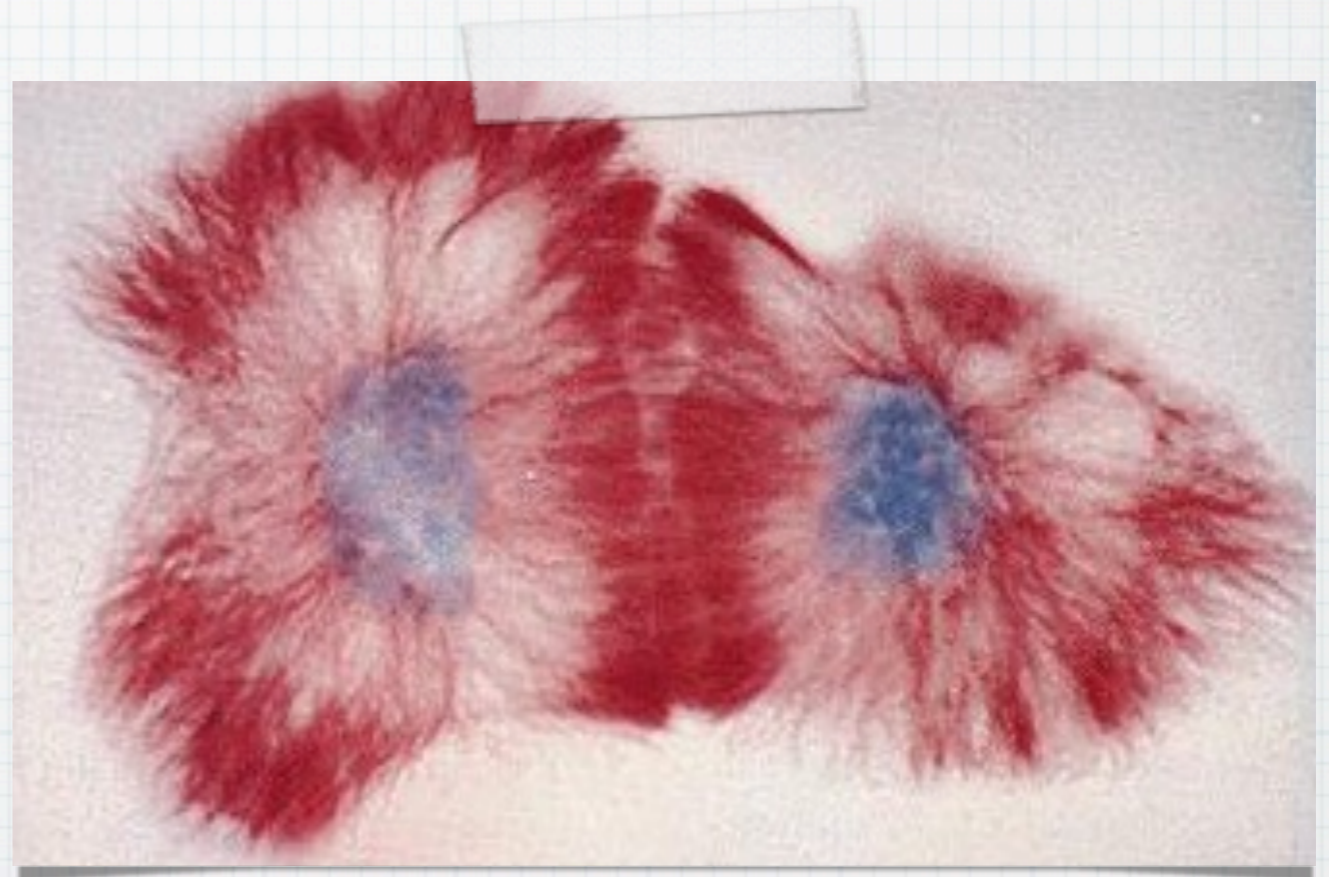
# Anaphase

- \* Anaphase - the chromosomes split up and chromatids are pulled to opposite ends of the cell.
- \* Pulled along by spindle fibers



# Telophase

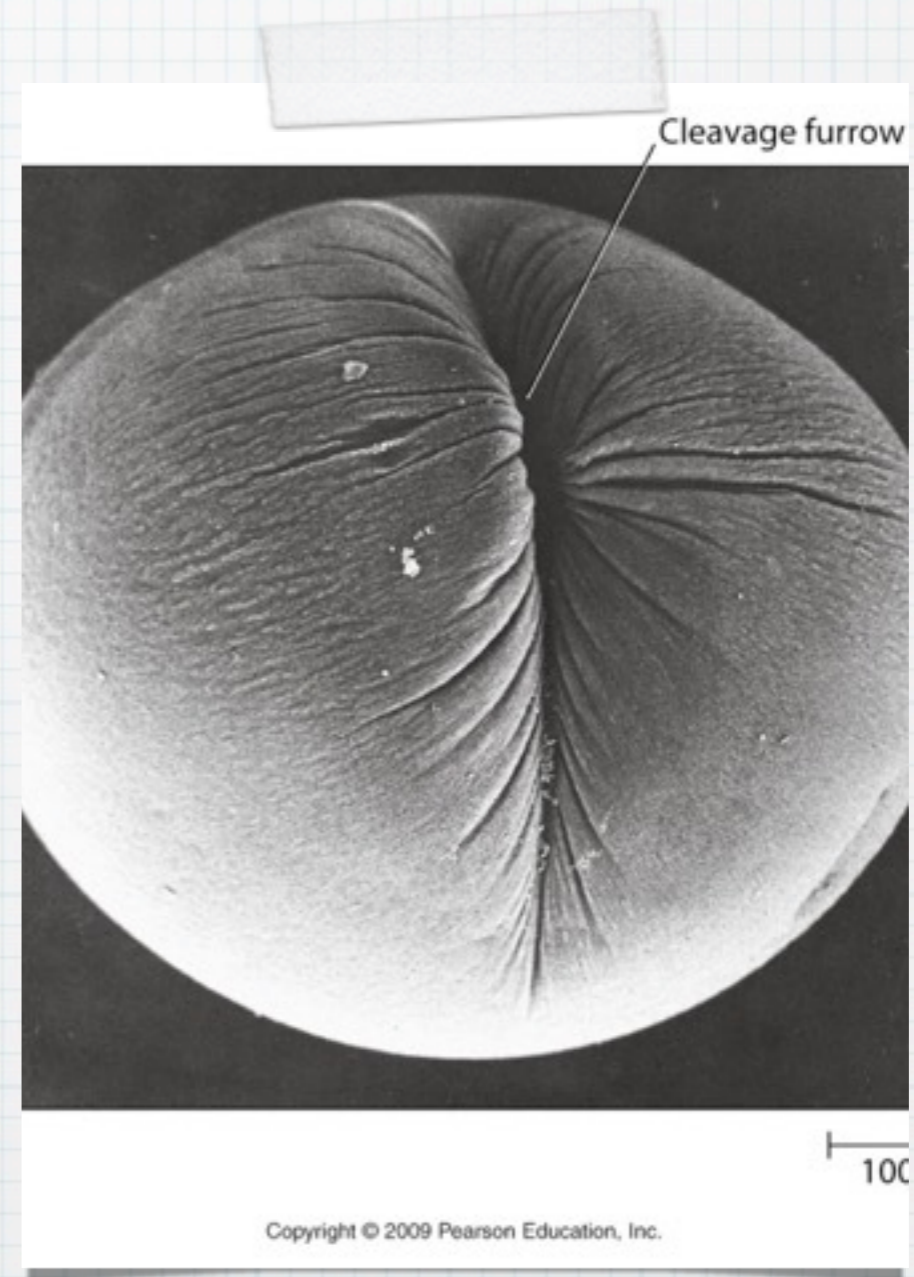
- \* Telophase - a new nuclear membrane forms around each set of chromatids.





# Cytokinesis

- \* Cytokinesis: the division of cytoplasm
- \* After nuclear division
- \* Pinching off the cell into 2 parts



# The Result

- \* Mitosis results in two identical cells forming called daughter cells
- \* each daughter cell has the same # of chromosomes as the parent cell
- \* Diploid cells

