Cell division

- Mitosis: cell division that forms identical daughter cells with the same number of chromosomes as the parent cell (duplicate and divide)

- Meiosis: cell division that forms daughter cells with half the number of chromosomes as the parent cell (reduction division). Daughter cells have different genetic composition. Occurs in sexual reproductive organs to form haploid gametes

Chromosomes

- Long coils of DNA, contained within the nuclei of cells
- Only become visible in the cell at the start of cell division
- Consist of two identical chromatids joined by centromere

- Homologous chromosomes: have the same structural features, each somatic cell has two complete sets of chromosomes

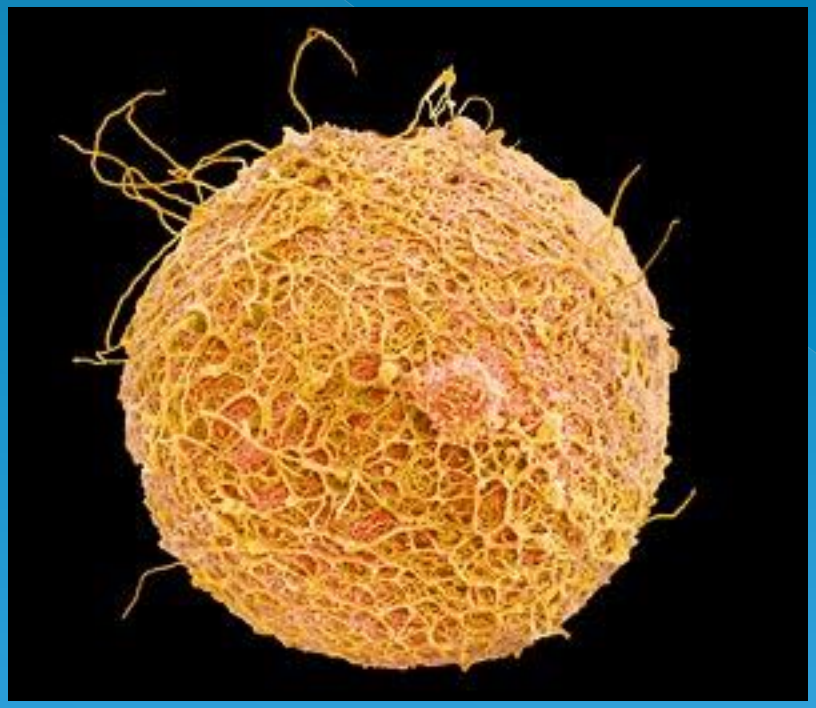
- Diploid cells: have two complete sets of chromosomes – body cells
- Haploid cells: have a single set of unpaired chromosomes – sex cells

- In each somatic cell there are 2 chromosomes that carry genes for a specific trait e.g. eye colour
  - 1 gene on the paternal chromosome
  - 1 gene on the maternal chromosome
- A pair of chromosomes that carry corresponding pairs of genes are called homologous pairs (In humans there are 23 pairs)

How do little elephants grow up to be BIG elephants?

Why do animals shed their skin?

The process of sexual reproduction begins after a sperm fertilizes an egg.



Cell Cycle

- 3 Phases:
  - Interphase
  - Karyokinesis (nuclear division)
  - Cytokinesis (cytoplasmic cleavage)

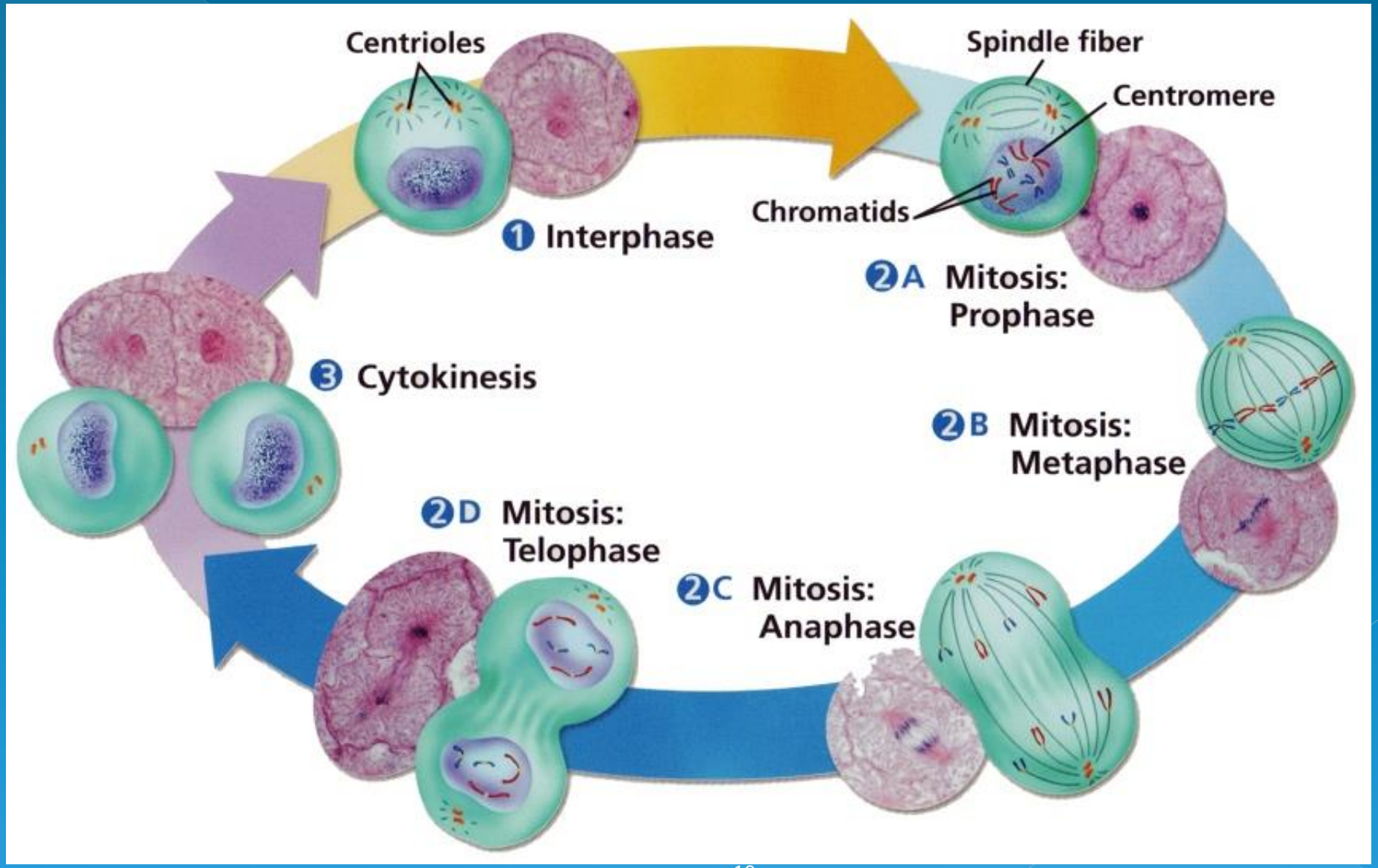
Importance of mitosis:

1. **Growth:** multicellular organisms
2. **Repair:** damaged cells
3. **Replacement:** worn-out cells
4. Genetic information to be passed on
5. Way for unicellular animals for reproduce asexually

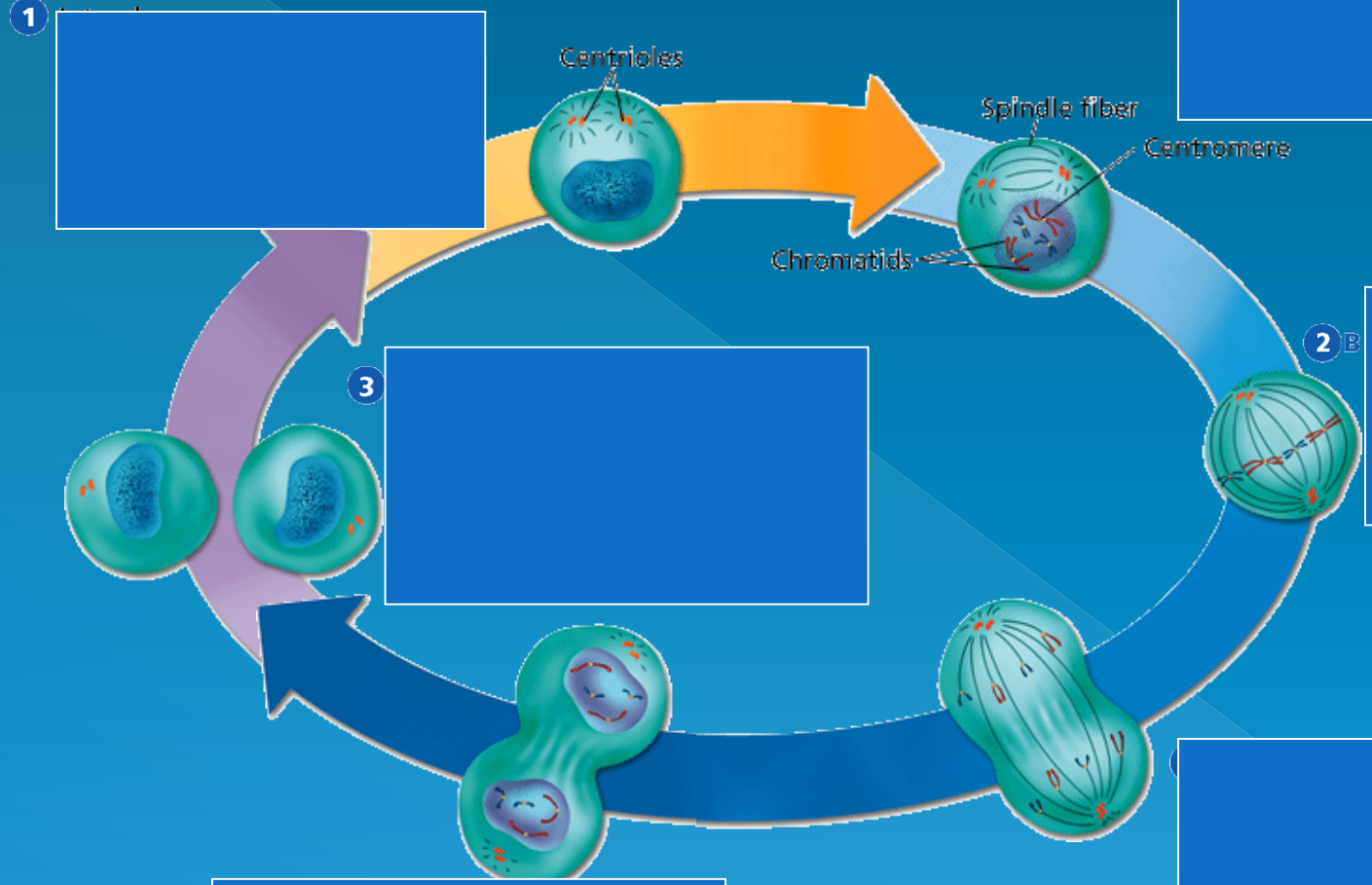
-**Vegetative reproduction:** part of a plant forms a new plant (root or stem)

-**Budding:** a bud grows on a parent organism, the bud then detaches to form a new organism.

Cell Cycle


Centrioles
Spindle fiber
Centromere
Chromatids
1 Interphase
2A Mitosis: Prophase
2B Mitosis: Metaphase
2C Mitosis: Anaphase
2D Mitosis: Telophase
3 Cytokinesis

The Cell Cycle



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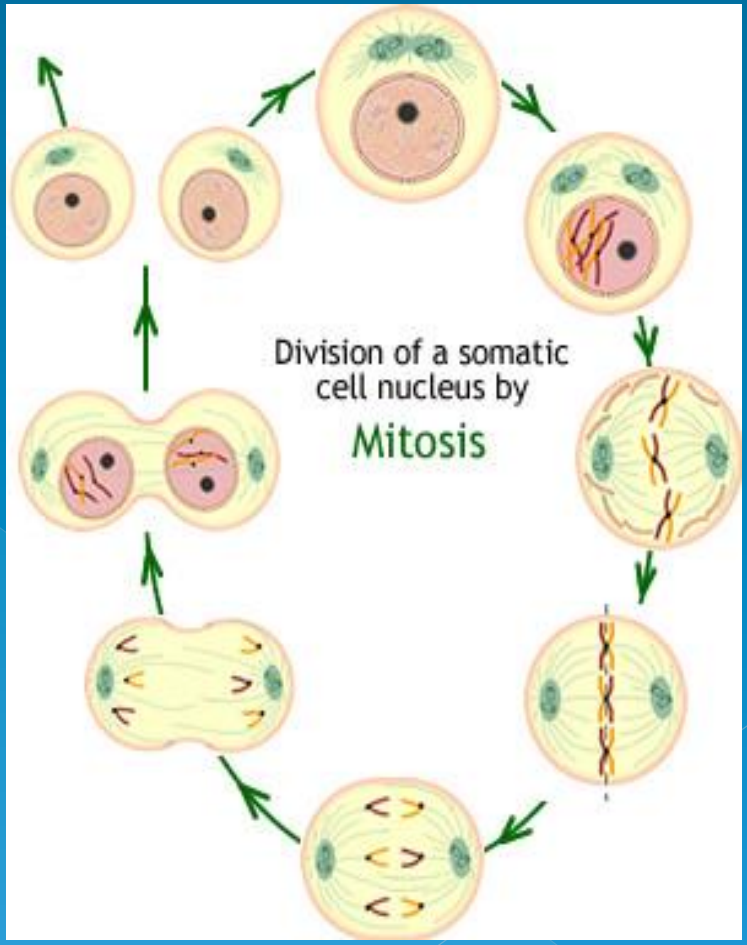
Animated Mitosis Cycle

- Interphase
- Prophase
- Metaphase
- Anaphase
- Telophase & Cytokinesis



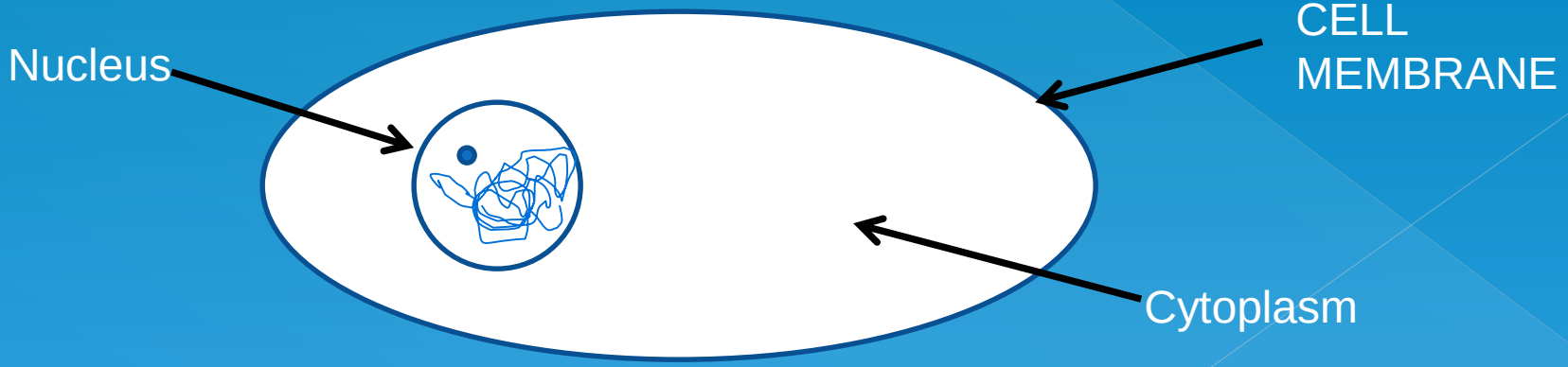
Centrioles

- Each animal cell has 2 centrioles found near the nucleus in the centrosome
- Lie close together at right angles
- Hollow cylinder made up of 9 fibrils
- Each fibre is made up of 3 microtubules
- The microtubules are used to grow the spindle fibres during cell division

Interphase

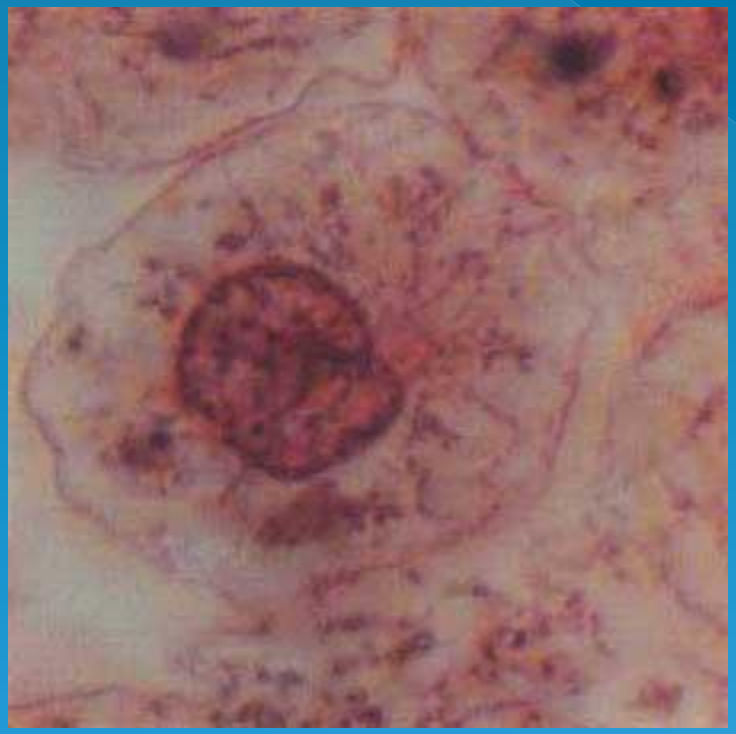
occurs before mitosis begins

- Daughter cells grow until they are mature
- Chromosomes are **copied** (# doubles)
- Chromosomes appear as threadlike coils (**chromatin**) at the start, but each chromosome and its copy(**sister** chromosome) change to sister chromatids at end of this phase



Interphase

Animal Cell



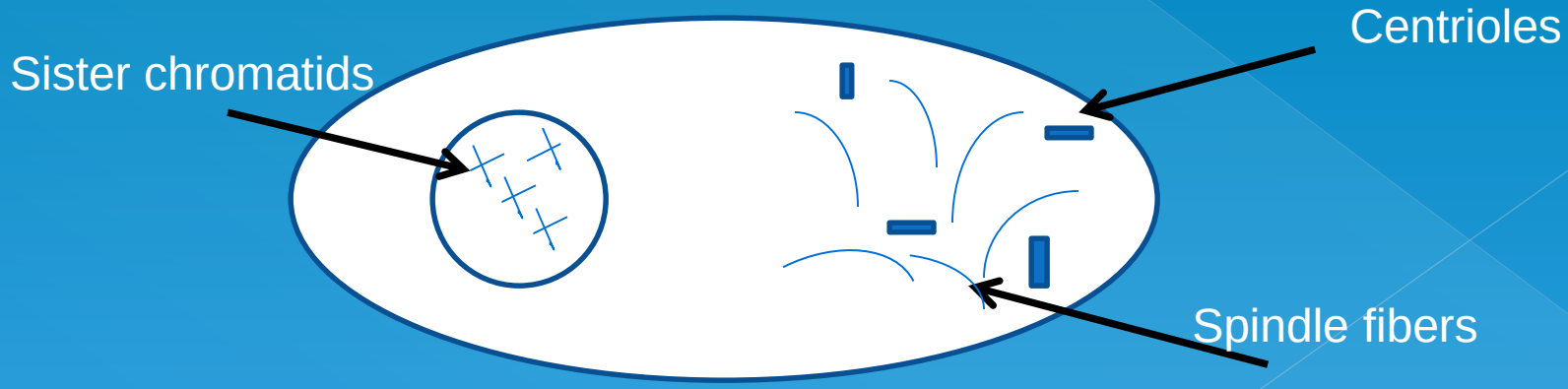
Plant Cell

Photographs from: http://www.bioweb.uncc.edu/biol1110/Stages.htm

Prophase

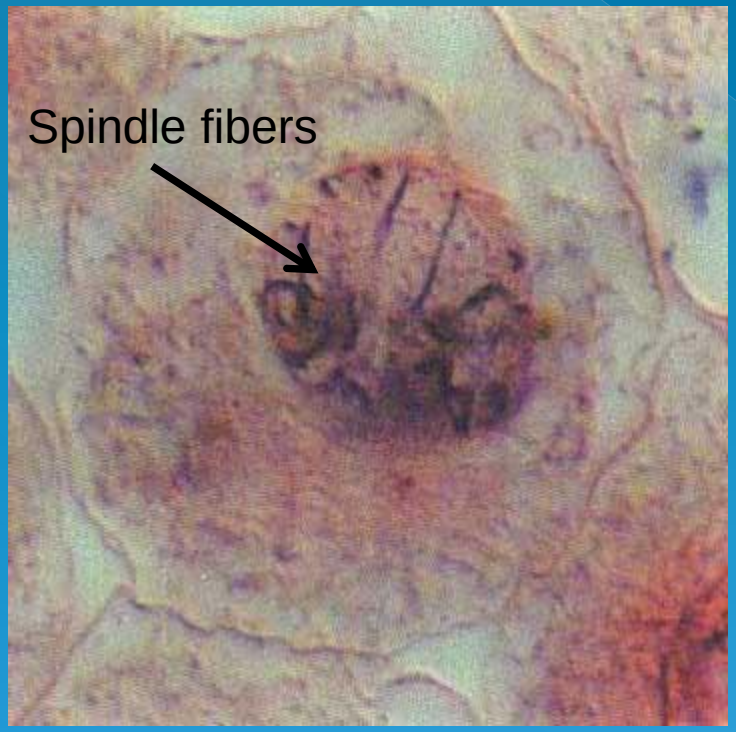
1st step in Mitosis

- **Mitosis** begins (cell begins to divide)
- **Centrioles** (or poles) divide and begin to move to opposite end of the cell.
- **Nucleolus** disintegrates
- Chromatin becomes visible as **chromosomes**
- **Spindle fibers** form between the poles.

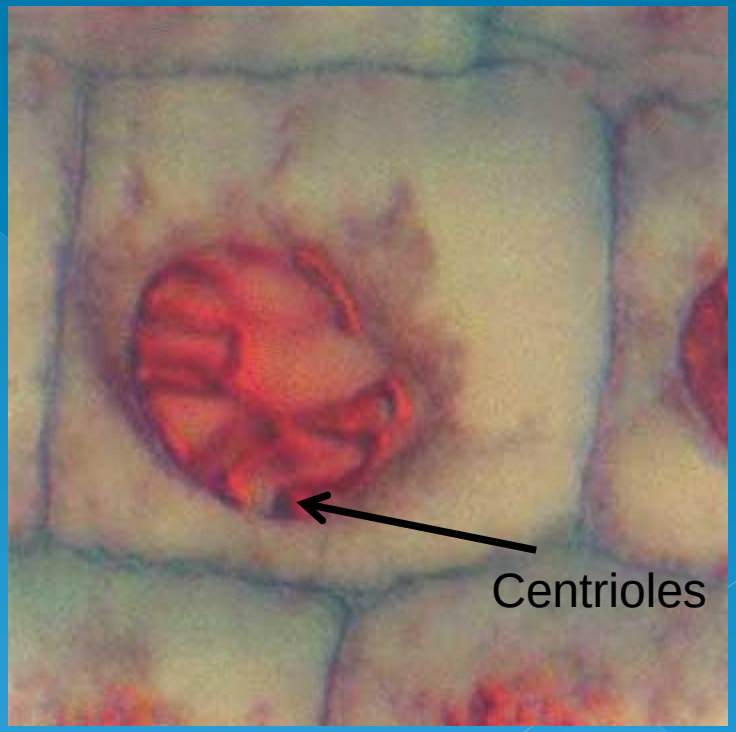


Prophase

Animal Cell



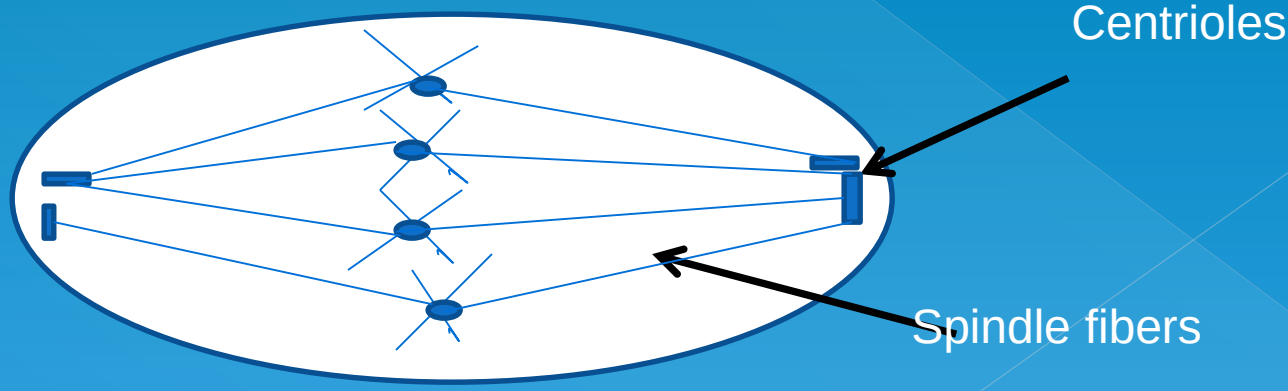
Plant Cell



Photographs from: http://www.bioweb.uncc.edu/biol1110/Stages.htm

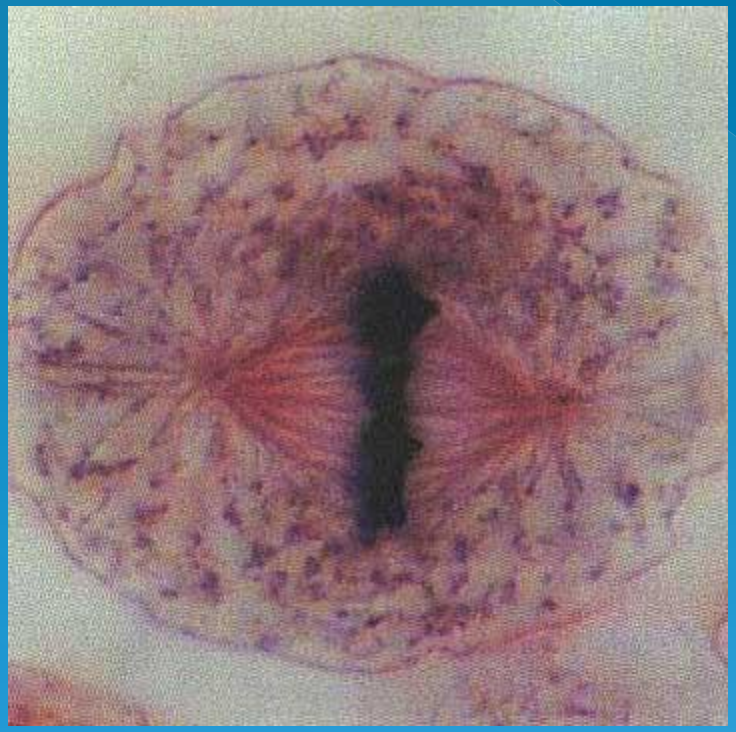
Metaphase
2nd step in Mitosis

- Centrioles form **spindle fibres**
- **Chromatids** (or pairs of chromosomes) attach to the spindle fibers along the equator.

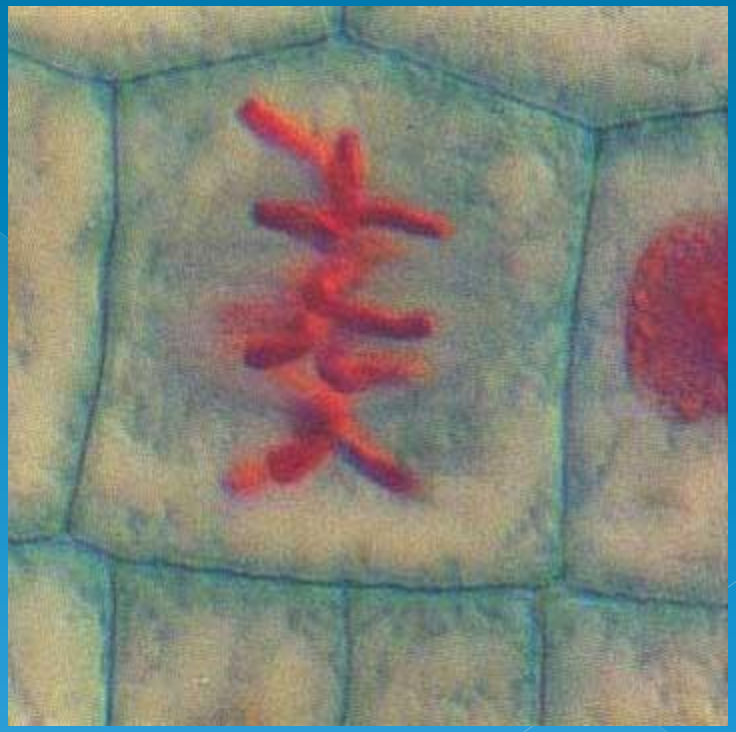


Metaphase

Animal Cell



Plant Cell

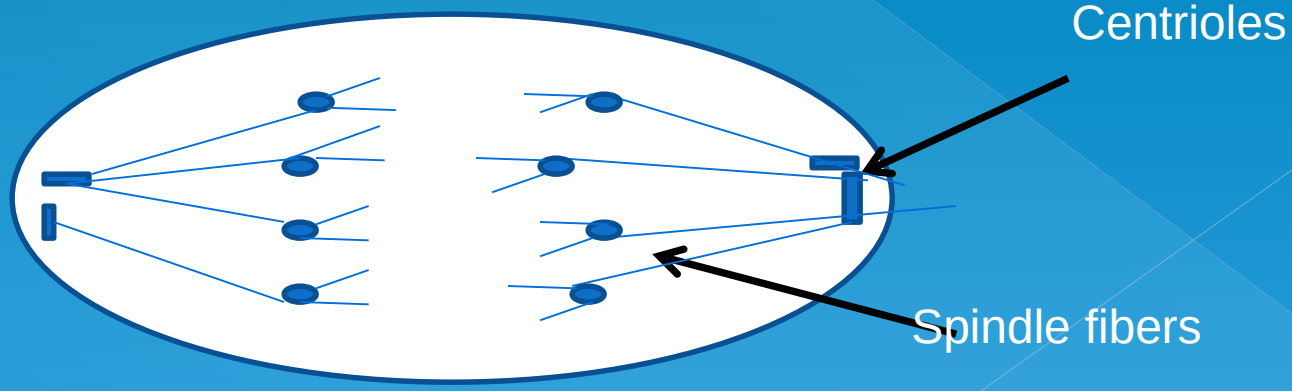


Photographs from: http://www.bioweb.uncc.edu/biol1110/Stages.htm

Anaphase

3rd step in Mitosis

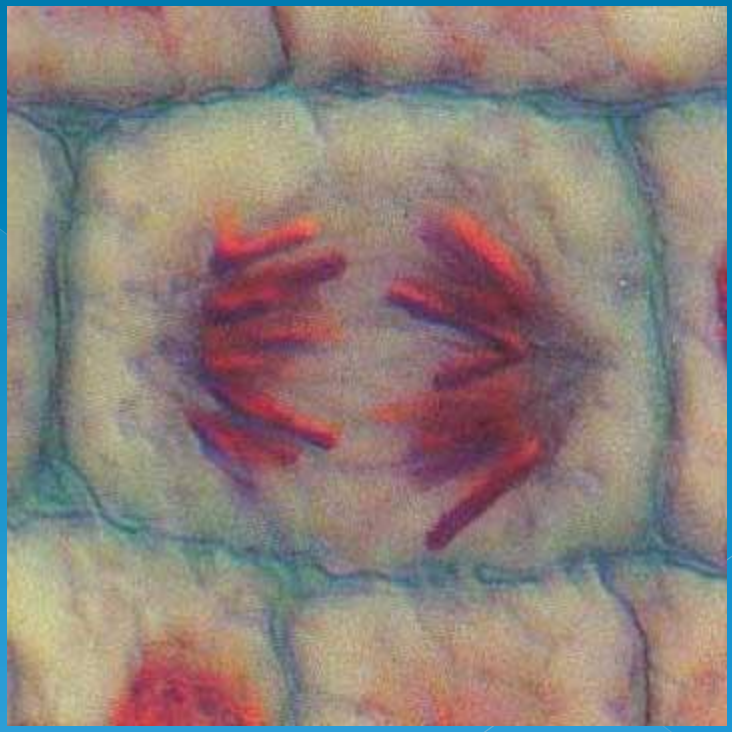
- **Chromatids** (or pairs of chromosomes) separate and begin to move to opposite ends of the cell as the spindle fibers shorten. Chromosomes split at the centromere.



Anaphase

Animal Cell

Plant Cell

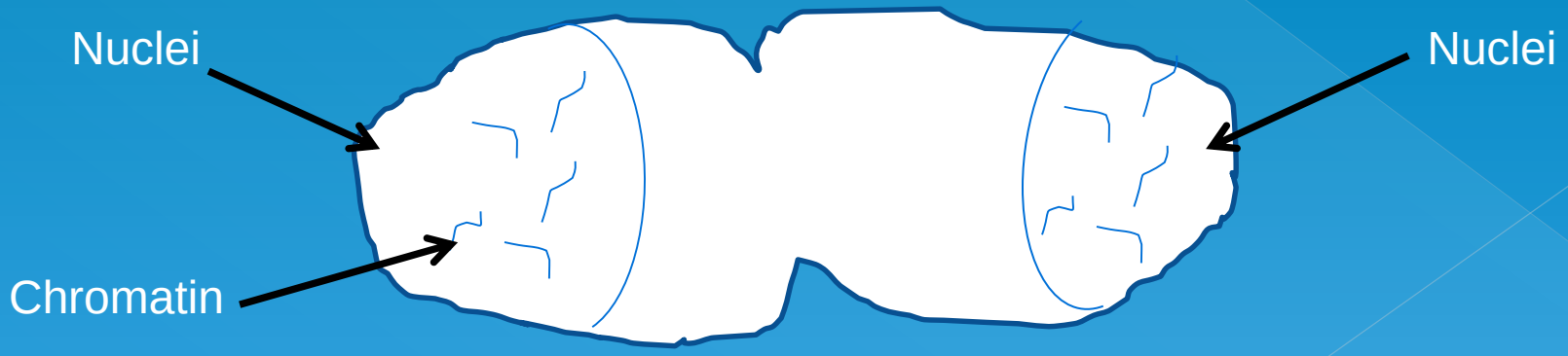


Photographs from: http://www.bioweb.uncc.edu/biol1110/Stages.htm

Telophase

4th step in Mitosis

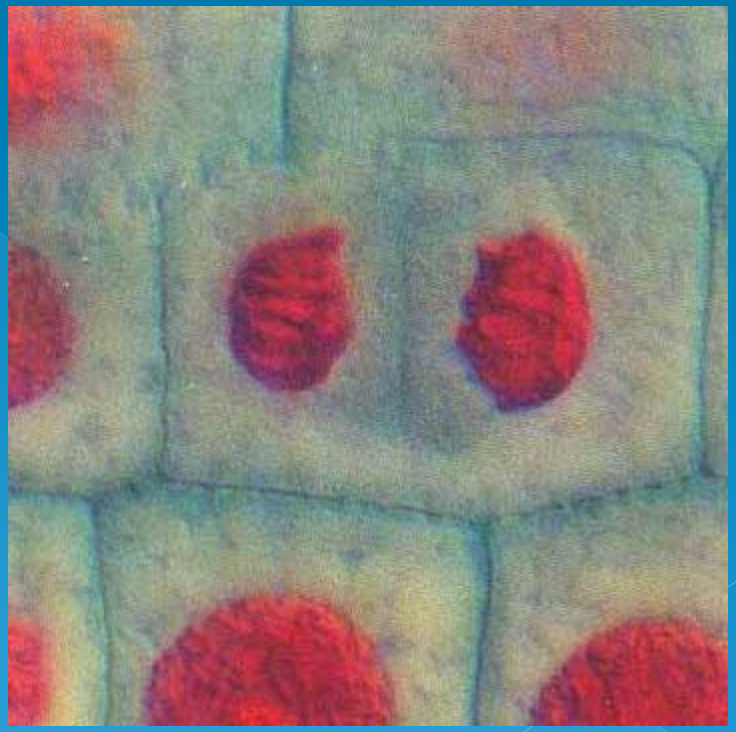
- Two new **nuclei** form.
- Chromosomes appear as chromatin **(threads** rather than **rods).**
- **Nucleus** and **nucleolus** re-form
- **Mitosis** ends.



Telophase

Animal Cell

Plant Cell

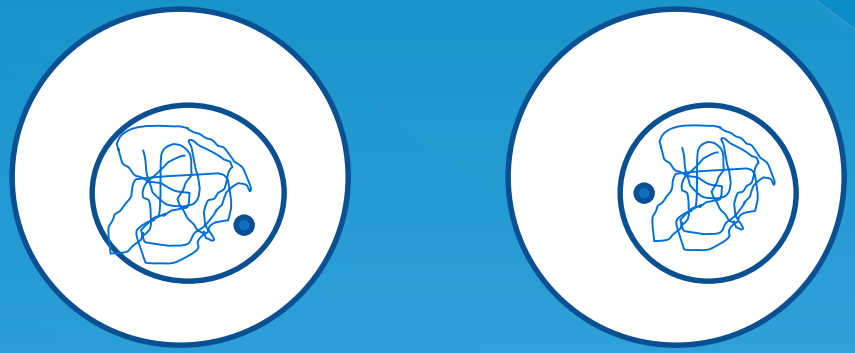


Photographs from: http://www.bioweb.uncc.edu/biol1110/Stages.htm

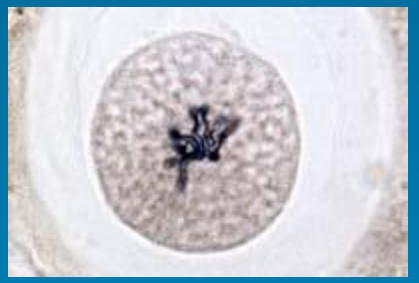
Cytokinesis

occurs after mitosis

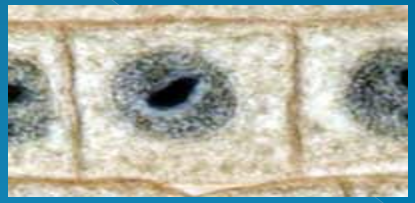
- Cell membrane moves inward to create two **daughter** cells – each with its own **nucleus** with identical **chromosomes.**
- Membrane moves inward by **constricting** around the equator of the cell



Animal Mitosis -- Review

Interphase 	**Prophase** 
Metaphase 	**Anaphase** 
Telophase 	**Interphase** 

Plant Mitosis -- Review

Interphase 	**Prophase** 
Metaphase 	**Anaphase** 
Telophase 	**Interphase** 

MITOSIS IN PLANT CELLS

- No centrioles, but spindle fibres do develop
- A new cell wall starts to form in the middle of the parent cell and is called a cell plate
- Golgi bodies help to build up the cell wall

REMEMBER!

- Interphase
- Prophase
- Metaphase
- Anaphase
- Telophase
- Cytokinesis

I Party More At The Club

- Activity 1 page 61