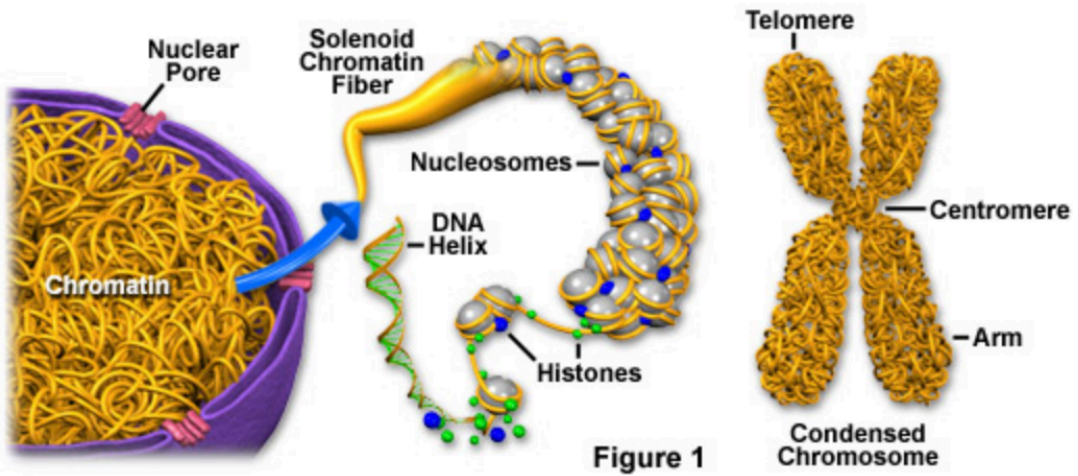
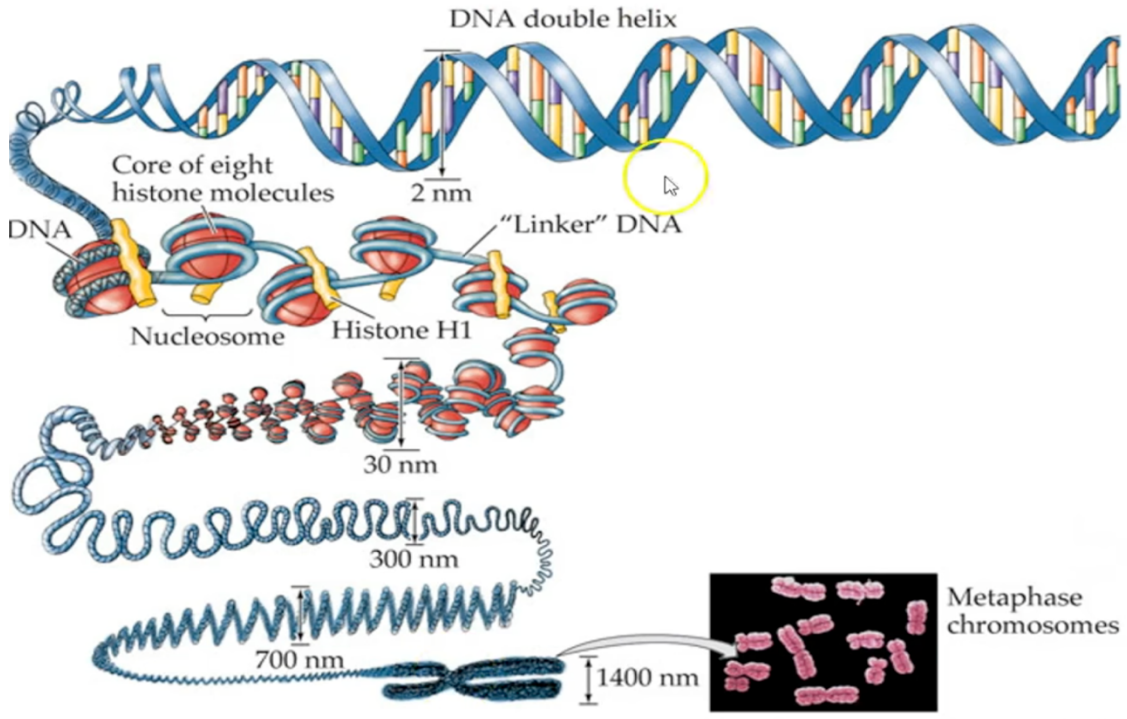


**Chromatin and Condensed Chromosome Structure**



**Figure 1**



**Histone**

Histones are proteins that DNA wraps around. They help keep the long DNA organized and compact.

**Nucleosome**

A nucleosome is one small section of DNA wrapped around a group of histones. It's like a bead on a string, and many nucleosomes help pack DNA tightly.

**Chromatin**

Chromatin is the loose, string-like form of DNA and proteins (including histones) found in the nucleus when the cell is not dividing.

**Chromatid**

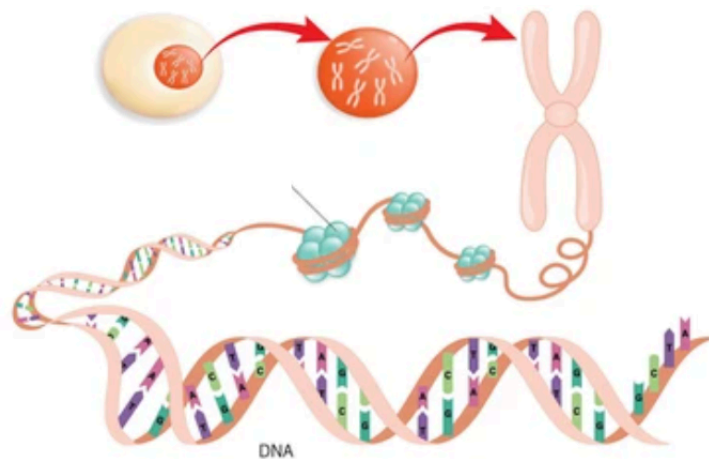
A chromatid is one half of a duplicated chromosome. When a cell gets ready to divide, it copies its DNA, and the two identical parts are called sister chromatids.

**Chromosome**

A chromosome is a tightly packed structure made of DNA and proteins. It carries genetic information and becomes visible when the cell is about to divide.

**Centromere**

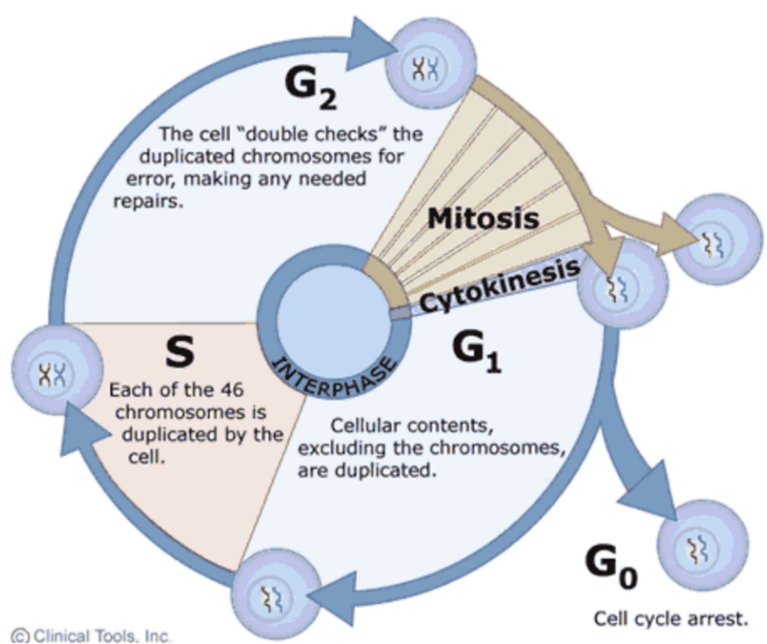
The centromere is the part of a chromosome where the two sister chromatids are joined together. It's also the point where spindle fibers attach during cell division.



## Why cell divide?

- Growth to increase the number of cells in the body.
- Repair to replace dead, damaged or old cells.
- Reproduction to sexually fuse 2 gametes (sperm and egg), produce offspring with genetic information.

Interphase takes 90% of time. It contains G<sub>1</sub>, S, and G<sub>2</sub> phase.



### G<sub>1</sub> Phase:

- The cell **grows bigger**
- It **makes proteins and organelles**
- It's like the cell is getting ready for a big task—dividing!

### S Phase (Synthesis DNA)

- The **DNA is copied** (each chromosome makes an exact copy of itself)
- Now the cell has **2 sets of DNA**, so both new cells can get a full copy after division.
- Think of it as photocopying all the instructions the cell needs.

### G<sub>2</sub> Phase:

- The cell keeps **growing**
- It **checks the DNA** to fix any mistakes
- It's like doing a final check before launching a rocket.

Mitosis and cytokinesis takes 10% of time.

### **Prophase**

- **Chromosomes become visible** (DNA condenses and coils up)
- The **nuclear membrane breaks down**
- **Spindle fibers** start to form from the centrosomes
- It's like packing up your books so you can move them easily.

### **Metaphase**

- **Chromosomes line up** in the **middle** of the cell
- Spindle fibers attach to the **centromeres** of each chromosome

### **Anaphase**

- **Spindle fibers pull the sister chromatids apart**
- Each chromatid moves to opposite sides (poles) of the cell

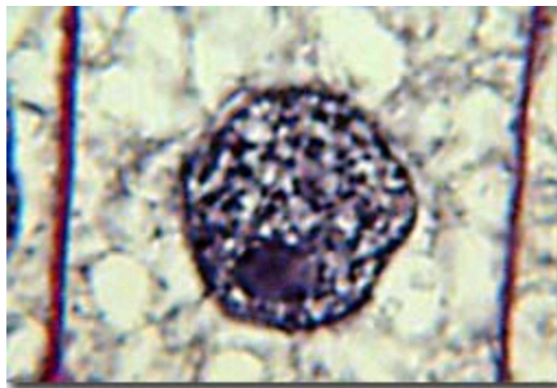
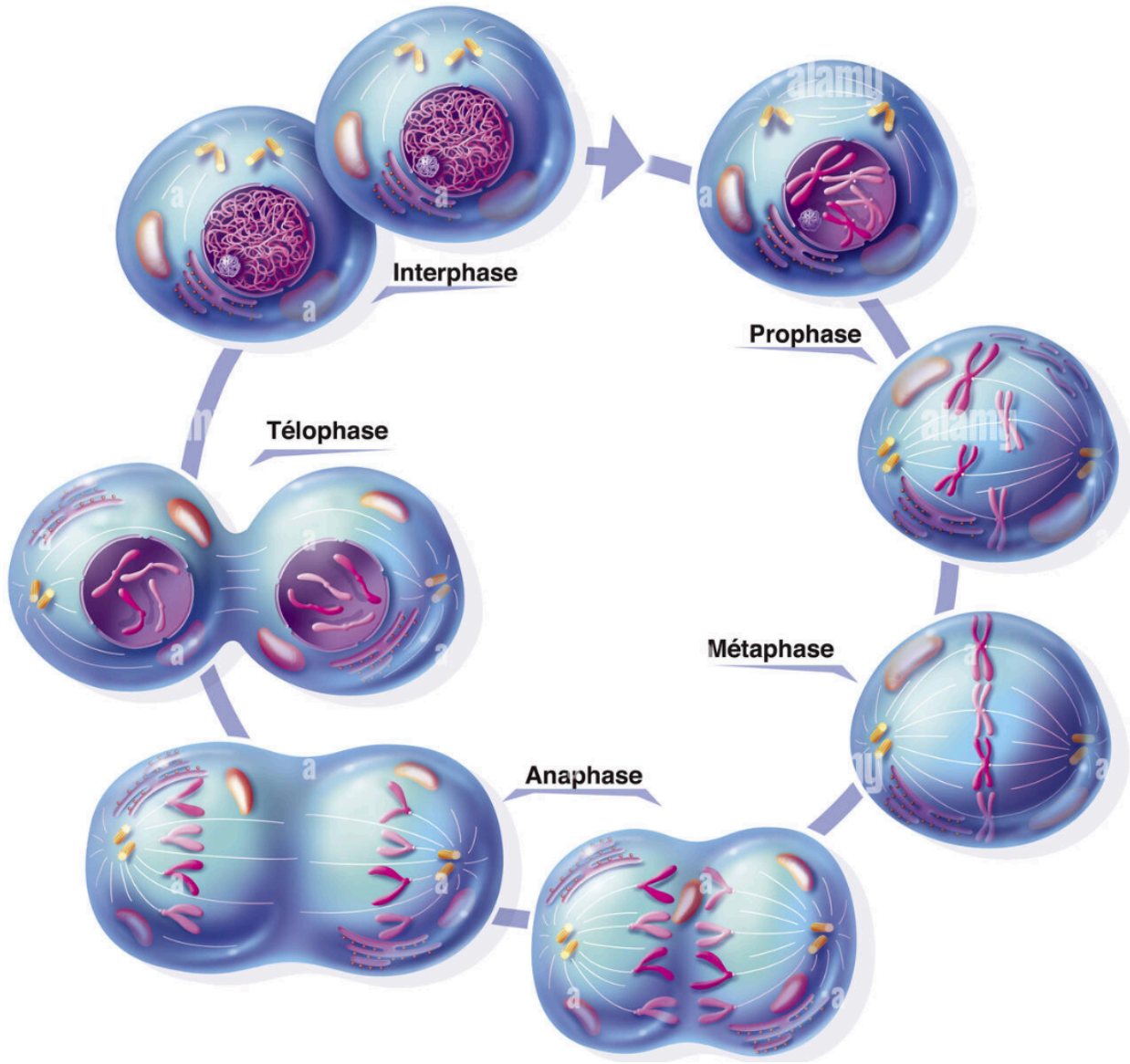
### **Telophase**

- **Two new nuclear membranes form** around the sets of chromosomes
- Chromosomes **start to uncoil** and become less visible
- The cell starts to **pinch in the middle**
- It is like the cell is setting up two new homes, one on each side.

Mitosis – divide DNA

### **Cytokinesis (not part of mitosis, but happens right after) – organelles**

- The **cell fully splits into two daughter cells including organelles**
- Each new cell has the same DNA and number of chromosomes
- Now you have **two identical cells**, ready to work!



**Resting Cell**



**Early Prophase**



**Late Prophase**



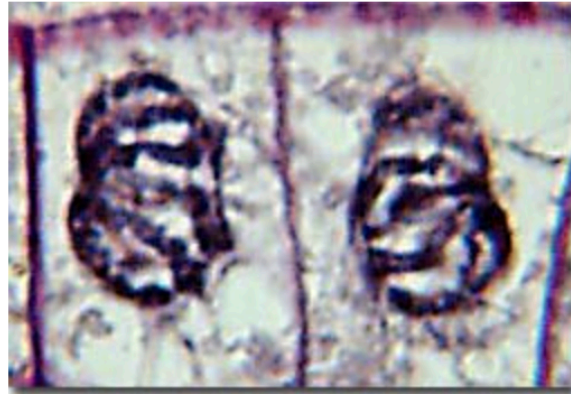
**Metaphase**



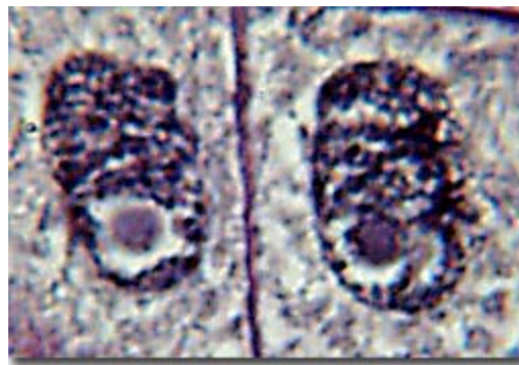
**Early Anaphase**



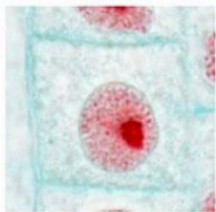
**Late Anaphase**



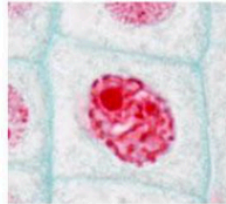
**Telophase**



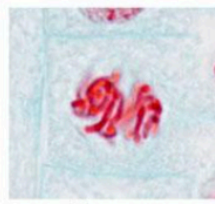
**Daughter Cells**



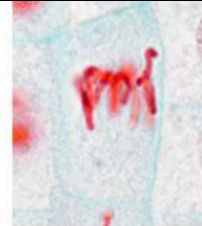
Interpahase



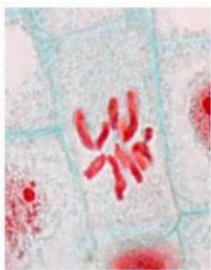
Prophase



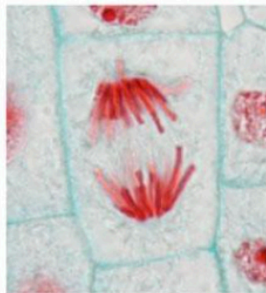
Later  
Phrophase



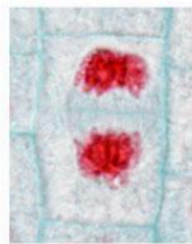
Metaphase



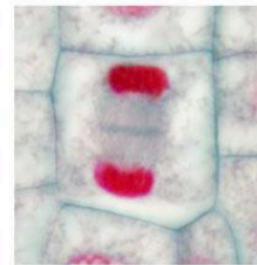
Early Anaphase



Anaphase



Telophase



Later Telophase

