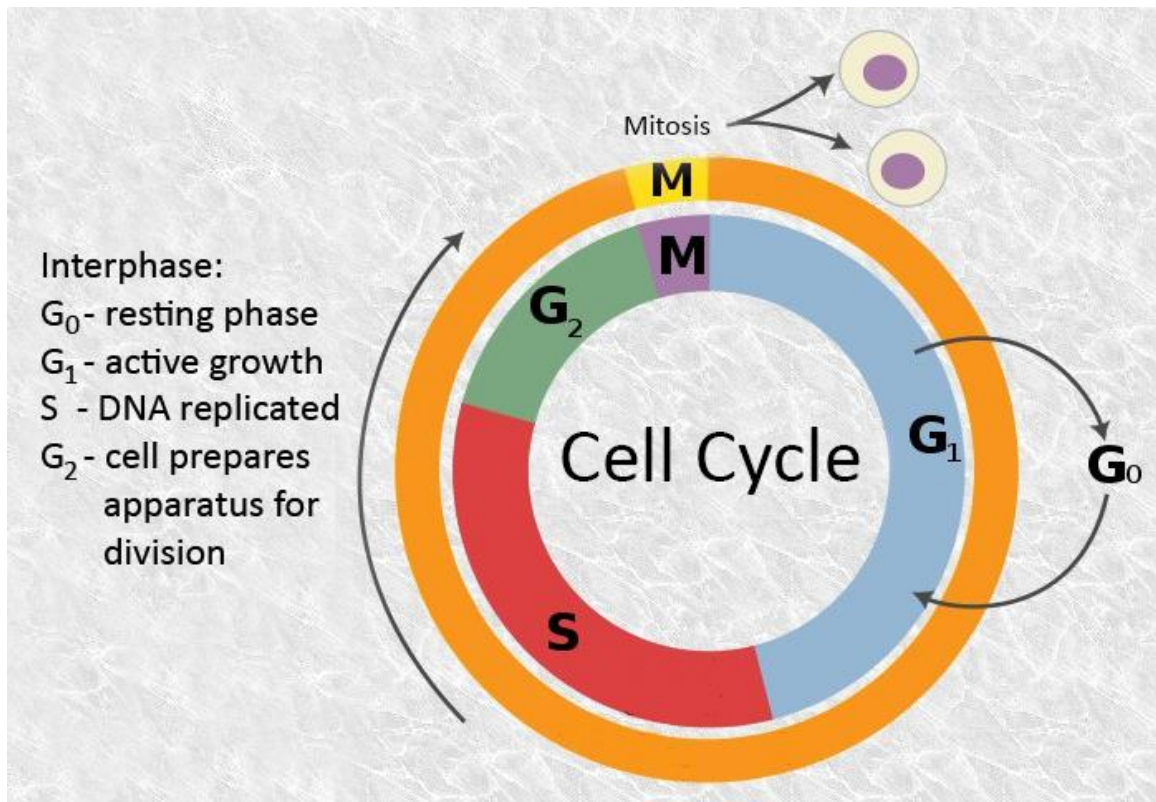


The Cell Cycle

Eukaryotic cells that are actively dividing undergo a series of stages known as the cell cycle. The cell cycle is divided into two basic parts: **interphase** and **mitosis**.




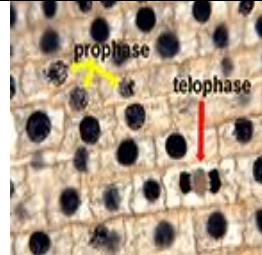

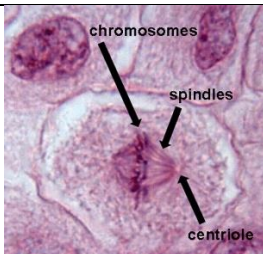
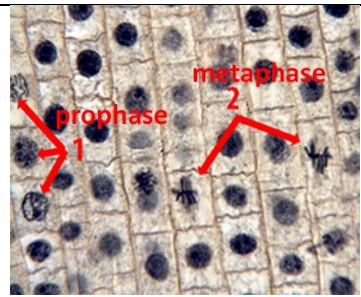
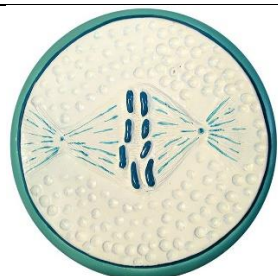
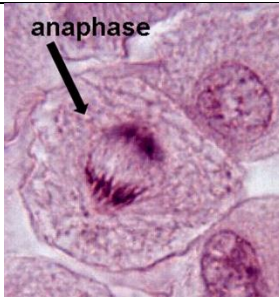
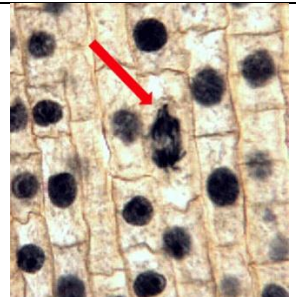
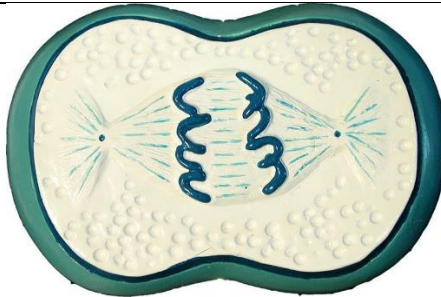
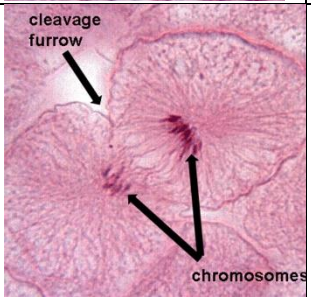
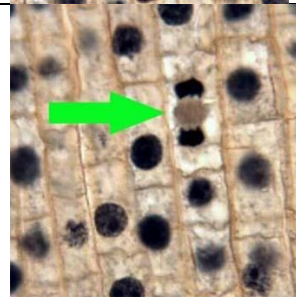

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Edited by S. Finazzo

During Interphase the cell is preparing itself for cell division and most importantly duplicating its DNA. The stages of interphase are Gap 1, Synthesis, and Gap 2.

- Gap 1 – During this stage the cell has just finished mitosis and is living its life as a newly created cell. It will function and undergo normal metabolic functions. Also during this stage, the cell will synthesize RNA and proteins that the cell needs for its growth and maturity. The cell gets ready to move to the S phase.
- Synthesis - During this stage the cell duplicates its DNA, termed synthesis. This is where semi-conservative replication of the cells DNA occurs. The cell creates 2 strands of DNA that are composed of half-old or original parent DNA and half-newly synthesized DNA. This is an important part of Interphase because the synthesis of the daughter cell DNA from the parent template will allow the daughter cells to be genetically identical.
- Gap 2 - During this stage the cell continues to grow and prepares to undergo mitosis. During this stage the cell continues to grow in size and produce the proteins and enzymes it will

need for mitosis. The cell begins assembling the apparatus needed to separate the chromosomes.

Mitosis involves the separation of the chromosomes (karyokinesis) and the division of the cytoplasm (cytokinesis). Mitosis (karyokinesis) is broken down into 4 stages: prophase, metaphase, anaphase, and telophase. Cytokinesis, the division of the cytoplasm is accomplished by the formation of a cleavage furrow (animal cells) or cell plate (plant cells). Cytokinesis typically begins in anaphase and is completed in telophase.

Phase of Mitosis	Animal Cell	Plant Cell	Model
Prophase			
Metaphase			
Anaphase			
Telophase			

Prophase – Chromosomes are visible. During this stage the chromosomes supercoil or condense and the spindle fibers begin to form between centrosomes located at the pole of the cells. The nuclear membrane also disintegrates at this time, freeing the chromosomes into the surrounding cytoplasm. In the later part of prophase, the spindle fibers attach to the centromere of each pair of sister chromatids and they begin to move towards the metaphase plate, also known as the equator.

Metaphase - During metaphase the sister chromatids align at the midpoint or equator of the cell.

Anaphase - During anaphase the spindle fibers are pulling on the sister chromatids causing their centromeres to split. The sister chromatids are now daughter chromatids and they migrate toward the opposite poles of the cell.

Telophase - During this stage the chromosomes have completed their migration to the poles of the cell. A new nuclear envelope forms around the daughter chromatids within each new daughter cell.

Cytokinesis – Cytokinesis begins during anaphase. The cytoplasm is separated equally in to each newly formed cell. The cell elongates and starts to cleave, creating 2 identical daughter cells.