Mitosis

Nuclear division during mitosis is very conservative. This process relies heavily on the integrity of the DNA replication where the mother cell's DNA is copied one-by-one and duplicate all. This is important in the preparation for division of the genetic material between the daughter cells that the mother cell will be divided to. The objective is to have daughter cells contain the same number of chromosomes and have the same genetic material in their chromosomes as the mother cell they came from.

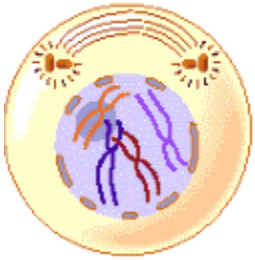
Mitosis happens for important reasons. Growth and repair are two major importance of mitosis to organisms. It also

used up to the point where no more sperm cells will be produced.

Mitosis is divided into four substages: prophase, metaphase, anaphase and telophase.

Prophase

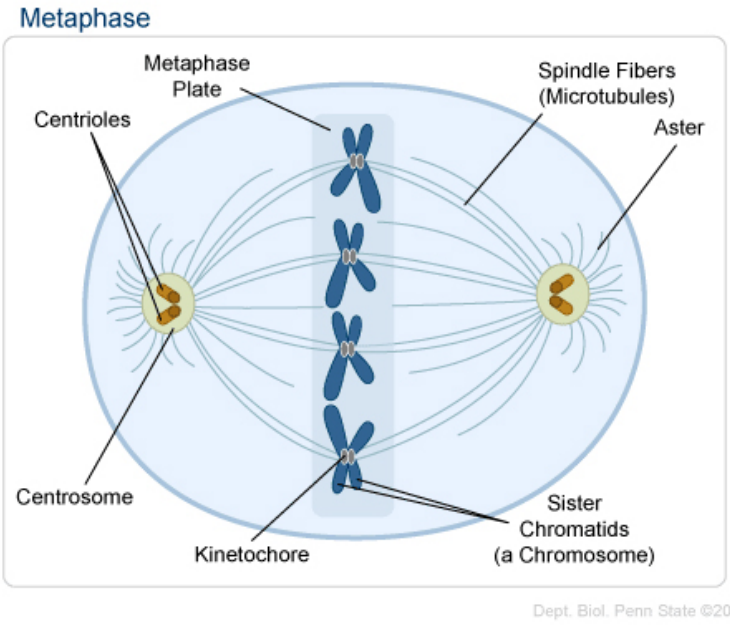
After interphase, the cell will proceed to mitosis proper. This stage is where chromatin will condense and thicken to become



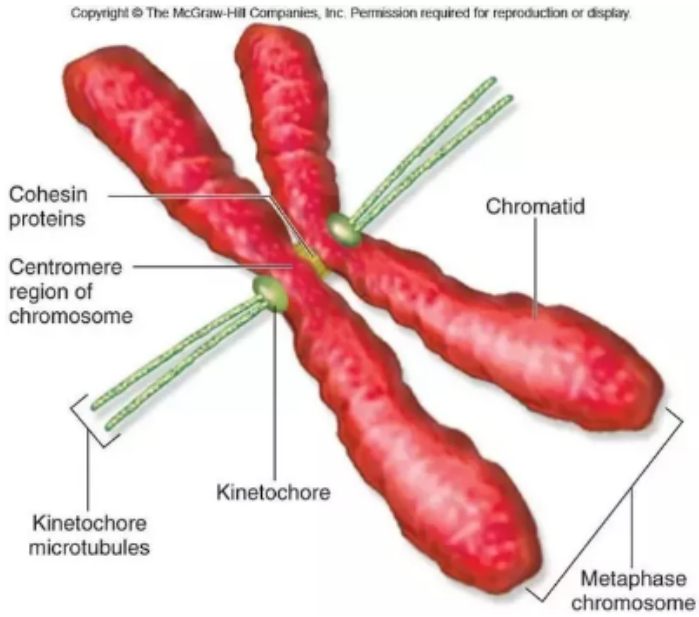
visible under the microscope. This observable macromolecule is called chromosome. At this point, the chromosomes is too much to be contained in the nucleus. This results to the temporary disintegration of the nuclear membrane, as well as the nucleolus

Metaphase

The spindle fibers that attach to the kinetochore of the centromere of each chromosome undergo changes in length that allows the relocation of chromosomes. Polymerization of spindle fibers is the addition of units to lengthen the fiber while depolymerization is achieved by removal of microtubule units to shorten the fiber. This polymerization and depolymerization of the fibers moves the chromosomes to an imaginary line at the middle of the cell. When the chromosomes are aligned at the middle in the metaphase plate, also known as the equatorial plate, cell is at metaphase.



Anaphase



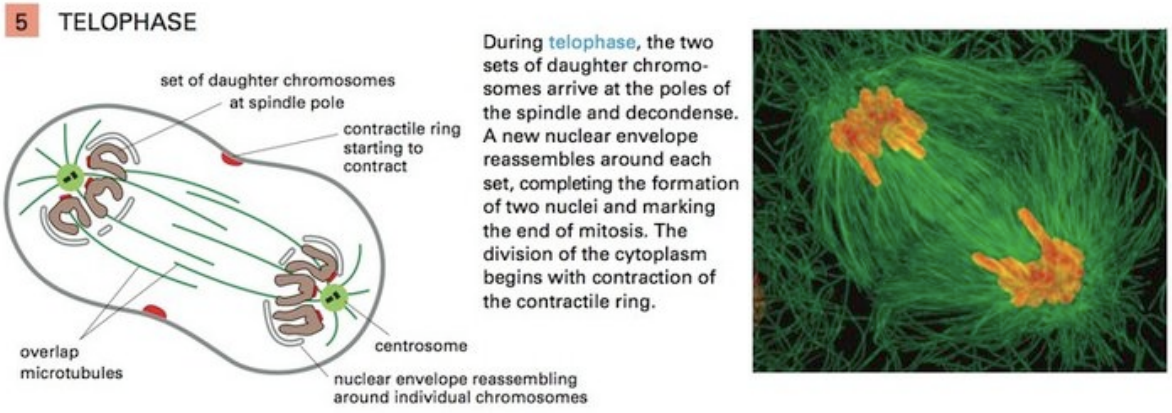
Chromosomes are constricted at a point along its length called the centromere. The centromere has proteins attached to it called the kinetochore. Each of the kinetochore is attached to the spindle fiber microtubule. At anaphase, the microtubule depolymerizes pulling the sister chromatids apart and move one

chromatid to the opposite direction of the other. Thus, if one

Telophase

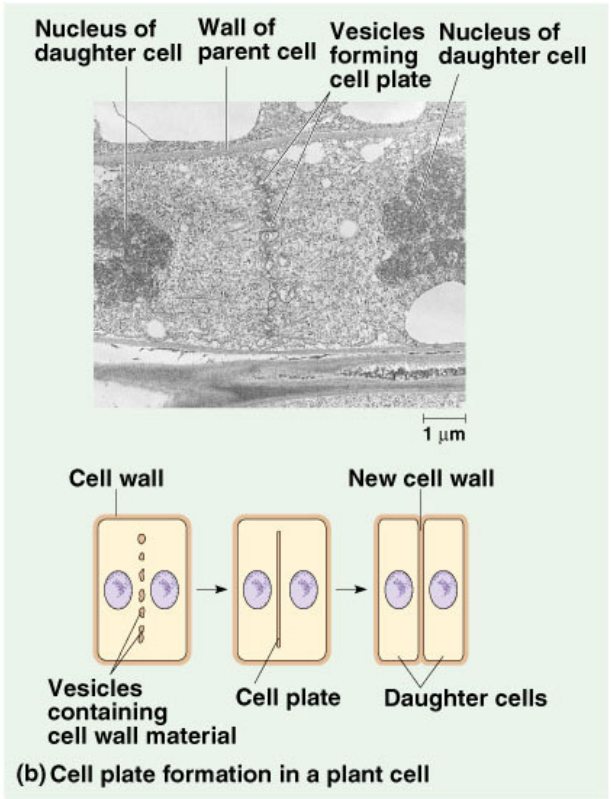
There are two types of spindle fiber, attached to the kinetochore of the chromosome and continuous from one centriole to another. As the spindle fiber attached to the centrioles shortens, the continuous spindle fiber lengthens resulting to the elongation of the cell.

At this stage, sister chromatids have reached the poles. This will initiate the events associated to the late telophase such as the disintegration of microtubules making the spindle fiber disappear. At the same time, reorganization of the nuclear membrane happens to contain the chromosome as it starts to thin out and become invisible to the microscope. The nucleolus re-appears at the same time the other events happen.



Cytokinesis or the division of the cytoplasm starts when the cleavage furrow in animal cell or the cell plate in plant cell forms. Cleavage furrow happens when a microtubule ring, plate forms with the help of vesicles containing cell wall material. These vesicles will deposit the cell wall between the two nuclei to divide it into two cells.

The difference between cytokinesis in animals and plants lies on the separation of the daughter cells. Generally, the daughter cell in plants remains together through the glue-like property of the middle lamellae while daughter cell in animals usually separates completely from each other.



(b) Cell plate formation in a plant cell