The Role of Chromosomes

CHROMOSOMES

Deoxyribonucleic acid (DNA) is the genetic material of the cell. The DNA is contained in genes. Chromosomes contain genes.

DNA

A typical human contains 46 chromosomes, 23 pairs. 22 pairs are somatic chromosomes and 1 pair controls the gender of the individual.

The cells undergo different forms of cell division, mitosis and meiosis.

Mitosis

During mitosis the parent cell divides to form two daughter cells with the same number of chromosomes as the parent cell. There are five stages of mitosis:

Interphase:

In this stage the chromosomes duplicate.

Prophase:

The chromatins condense into chromosomes. Since replication occurred each chromatin has a copy of itself. It attaches to its duplicate by a centromere. Centrioles are used in the formation of the mitotic spindle.

Metaphase:

The chromosomes line up at the equator.

Anaphase:

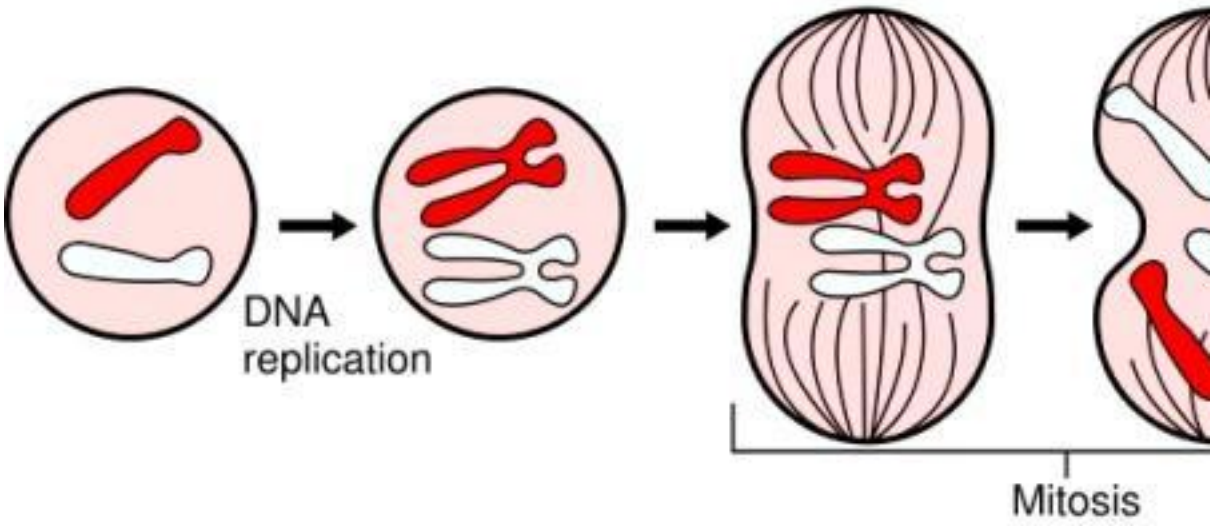
The band between sister chromosomes are broken and the separate. They each move to different poles.

Telophase:

Corresponding sister chromosomes attach at opposite ends of the cells. The nuclear envelope of the cell reforms.

Cytokinesis:

This is the splitting of the cytoplasm.



Major events in mitosis

<u>Meiosis</u>

It is a form of cell division in which the daughter cells end with half the number of chromosomes as the parent cell, this is a haploid condition. This kind of cell division takes place in reproductive cells (sperm and egg) so that during fusion of the nuclei the

offspring does not end up with twice the number of chromosomes in comparison to the original. Meiosis involves two divisions, meiosis1 and meiosis 2.

DIVISION 1

Interphase:

The chromosomes replicate.

Prophase:

Homologous chromosomes pair and form synapses. The paired chromosomes are called bivalent (tetrad).

Metaphase:

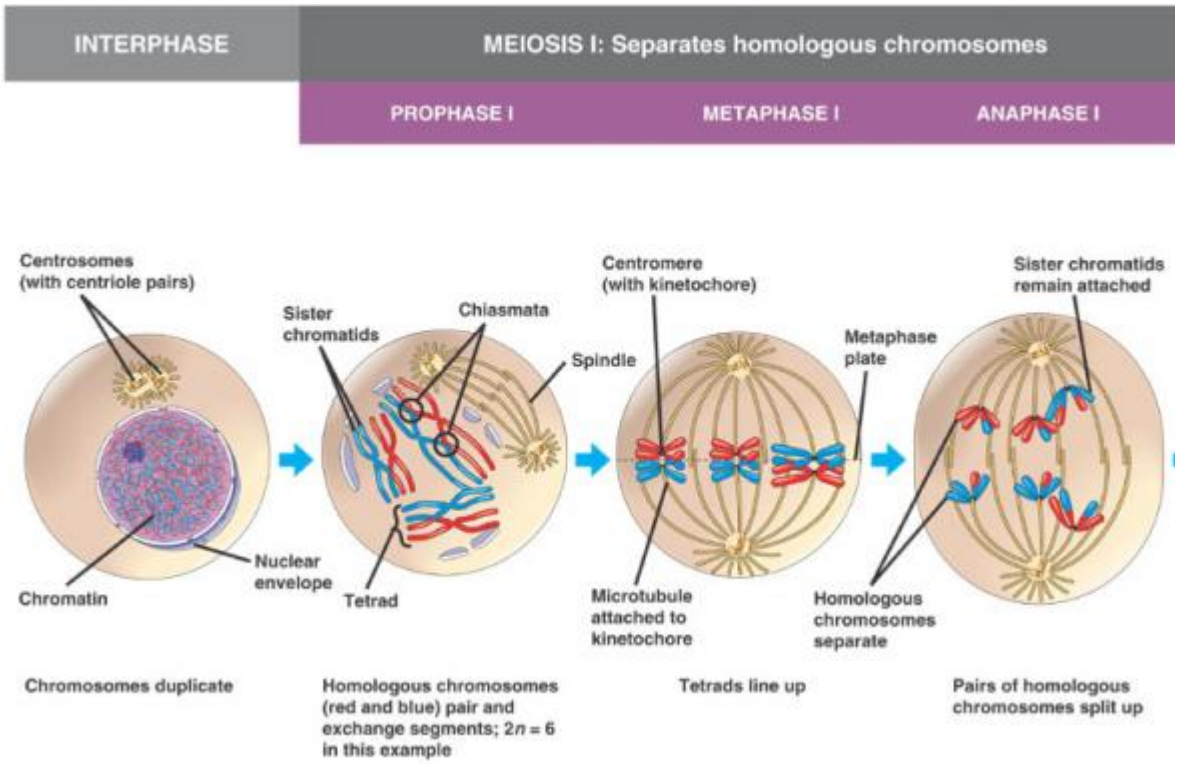
Homologous pairs move together along the equator.

Anaphase:

Homologous chromosomes are pulled apart. Whole chromosomes are pulled toward opposing poles forming haploid sets.

Telophase:

Each daughter cell now has half the number of chromosomes, but each chromosome consists of a pair of chromatids.



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DIVISION 2

Prophase:

Disappearance of the nuclei and the nuclear envelope.

Metaphase:

The chromosomes rotate about 90 degrees at the equator.

Anaphase:

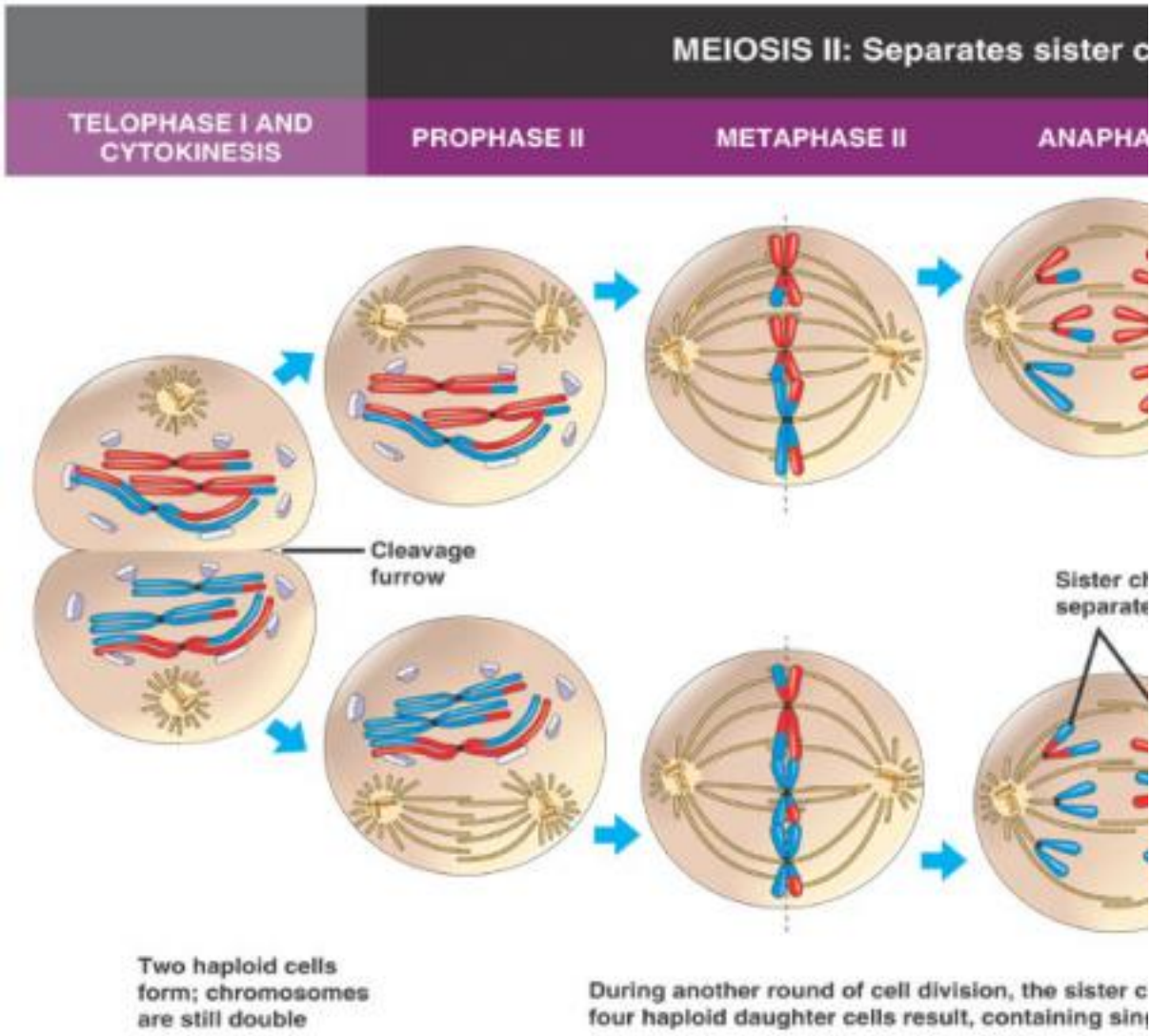
The chromatids are pulled apart and are called sister chromosomes and migrate to separate poles.

Telophase:

Nuclear envelope reforms and four daughter cells, each with a haploid set of chromosomes.

Cytokinesis:

Splitting of the cytoplasm.



Meiosis Source 2