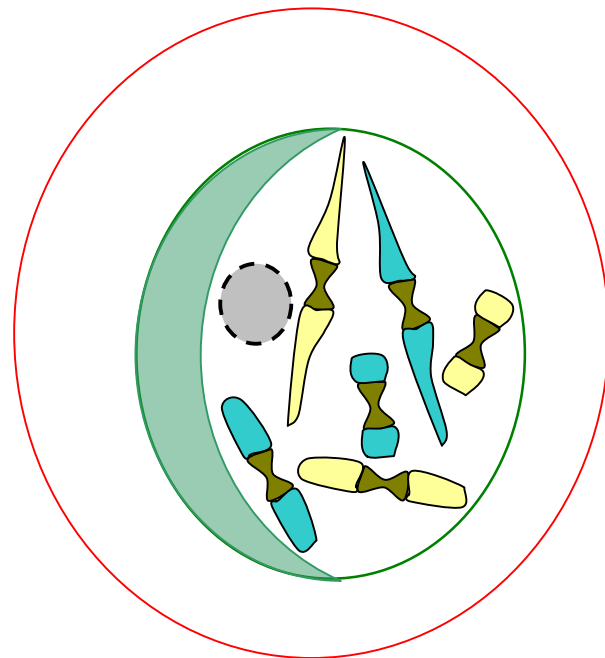
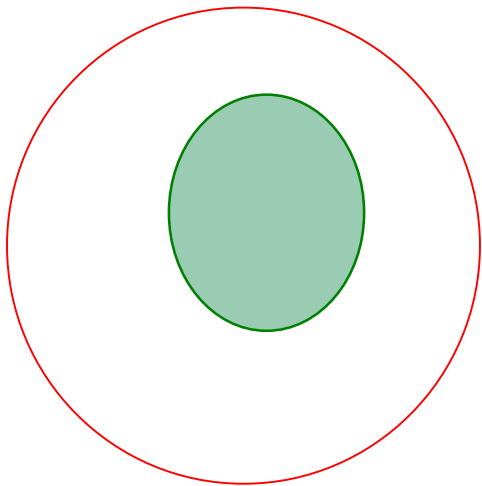


Mitosis: Cell division

Here is a quick visual review of the ordinary process of cell division. The ordinary eukaryotic cell has a nucleus containing several pairs of chromosomes. Each chromosome determines specific characteristics of the individual, such as eye-color, ear shape, and hair curl, while the chromosome configuration determines the schedule of growth.. The chromosomes come in pairs because the individual cell has one of each type from the father and one from the mother. When cells replicate (copy themselves) by mitosis, the new cells, called daughter cells, are, ordinarily, exactly the same as the original cell. You will notice that each chromosome has a central portion (called a centromere) which is drawn like an hourglass.

Usually, when we draw a cell, we just draw the nucleus as a single entity; there are lots of things going on in the cell, and lots of little organelles to make them happen. But to talk about mitosis, we are going to ignore everything else in the cell. The nucleus and the things in the nucleus that work for reproduction are all that matters.

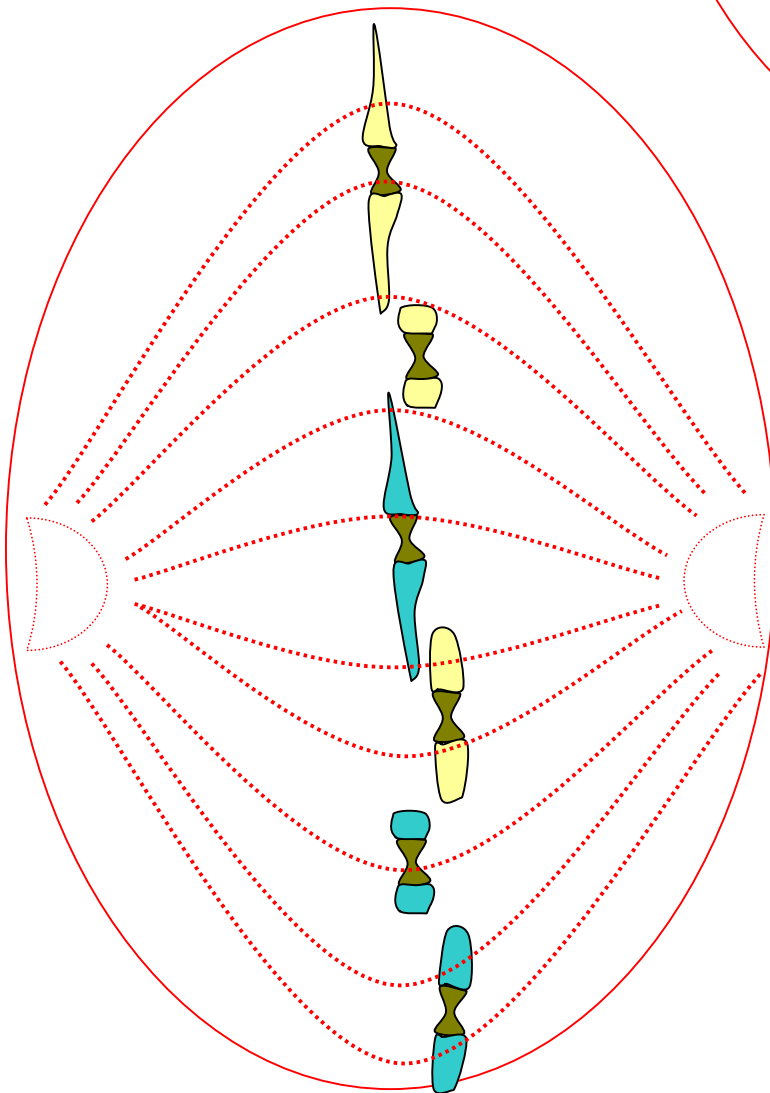
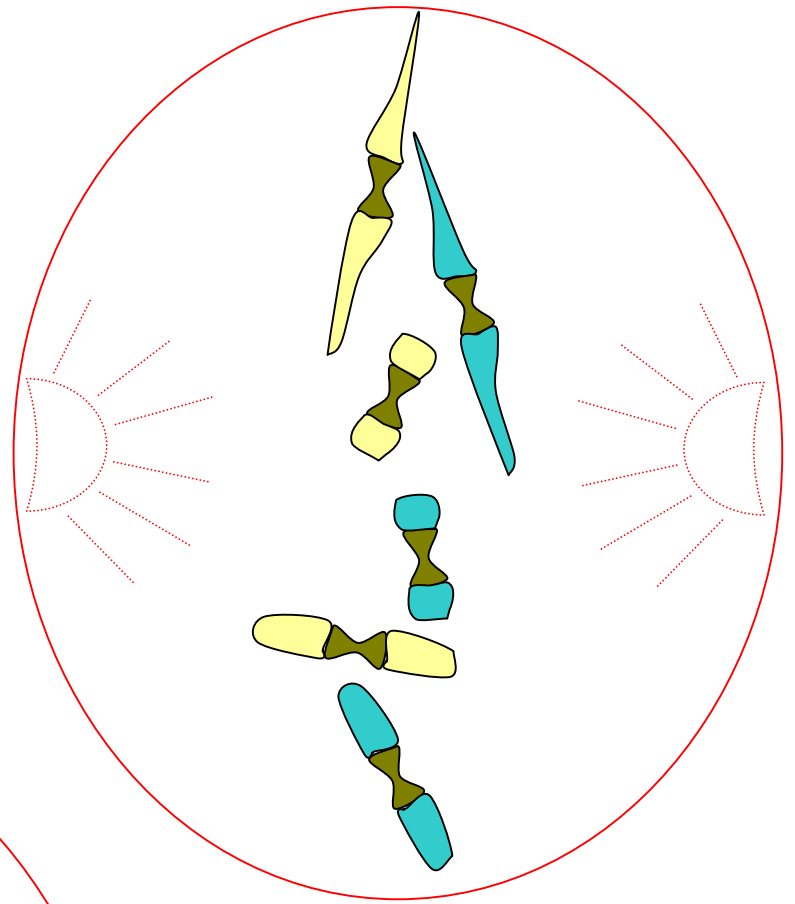
Besides the chromosomes, the nucleus contains a centrosome with one or two centrioles inside it.



Left: A single cell with its nucleus
 Right: a single cell with its nucleus
 cut away so you can see the
 chromosomes, two of each type, and
 the centrosome.

At the start of mitosis, the wall of the nucleus dissolves and the chromosomes move towards the equatorial plane of the cell. Meantime, the wall of the centrosome dissolves and the centriole duplicates if there is only one.

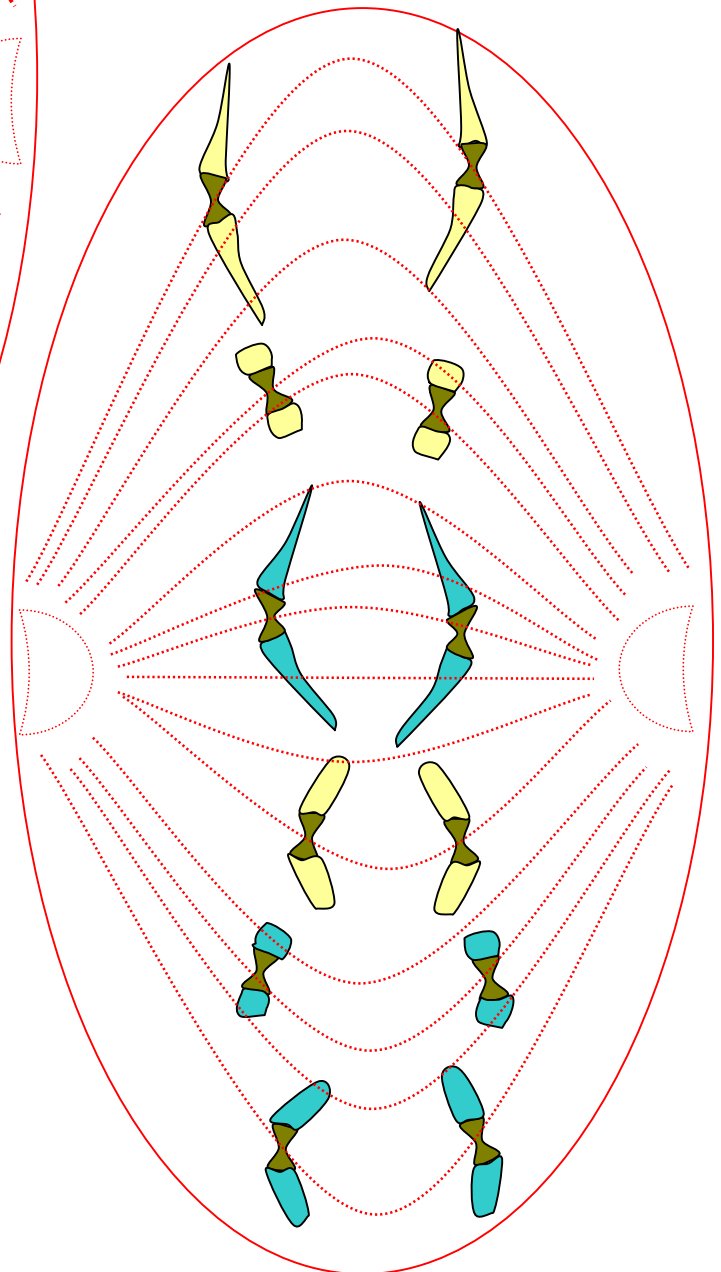
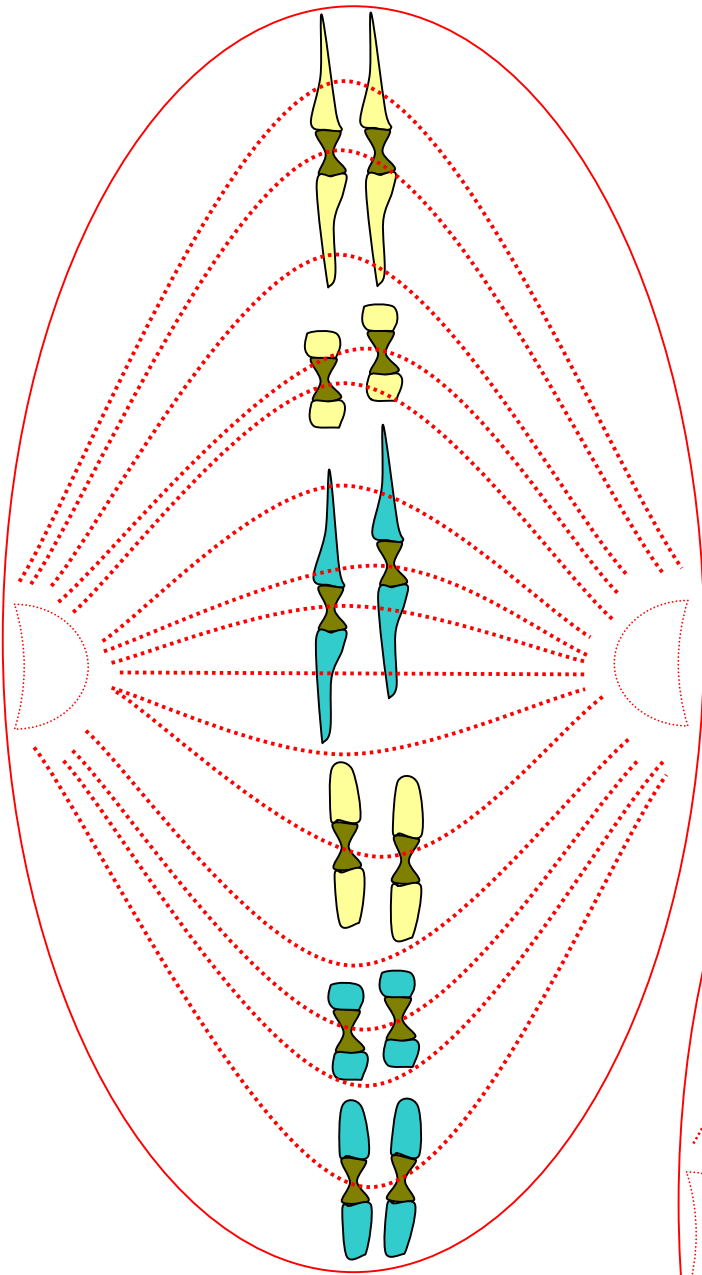
Then the centrioles move to opposite poles of the cell. ("centrioles move to poles") Long threads of cytoplasm called spindle fibers begin to radiate from the two centrioles. This is called the formation of asters, because it looks like the flower called an aster.



In time the fibers reach entirely from one centriole to the other and the whole arrangement has the appearance of a spindle. The fibers are called spindle fibers.

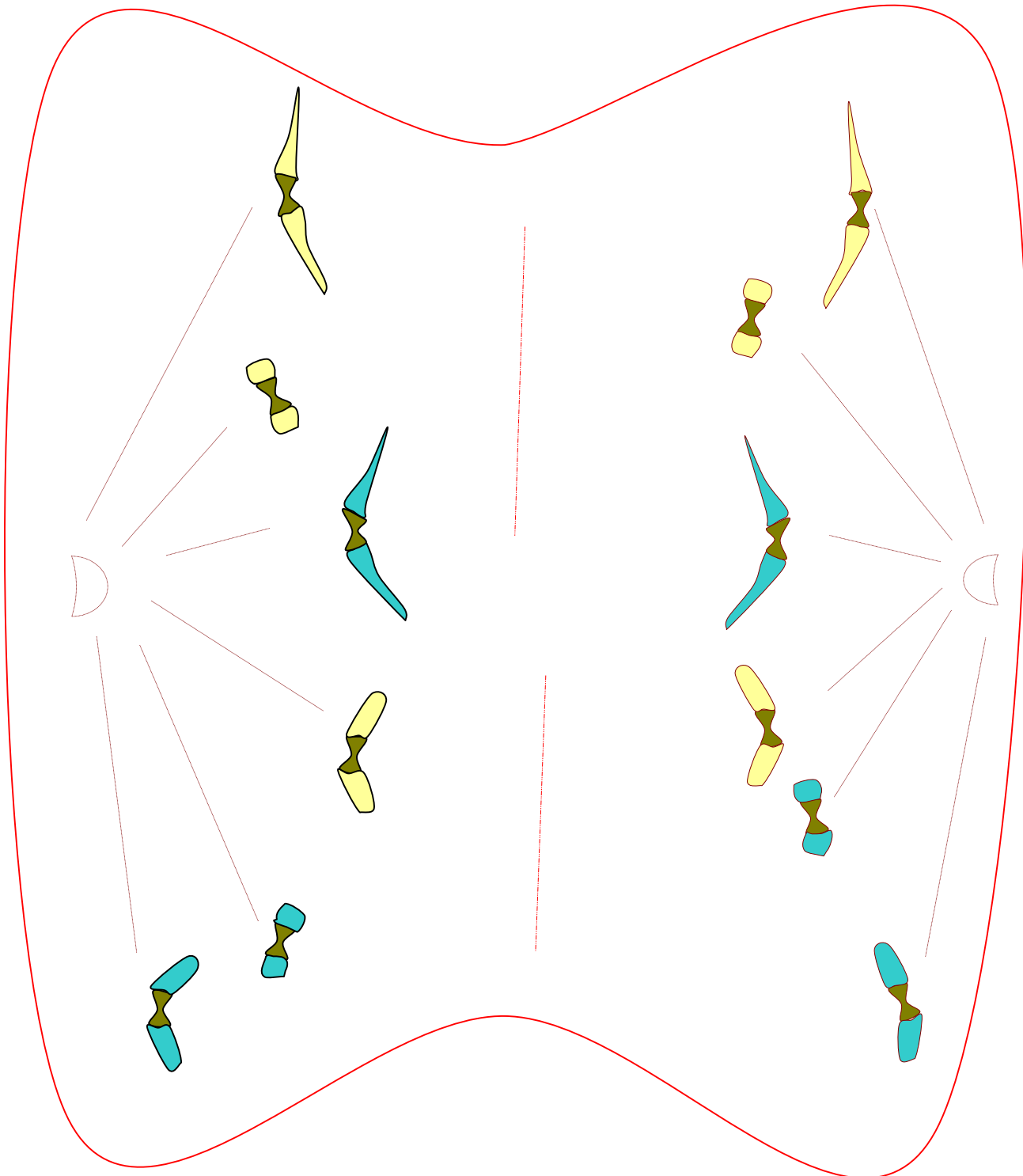
[Note: the cell does not actually elongate; it remains round. I have drawn it this way so you can still see all the chromosomes.]

When the chromosome are all lined up in the equatorial plane of the cell, (that is, not just around the "equator" as I have drawn, but all across the cell in one flat disc), each takes its place on a spindle fiber and is exactly duplicated while the centromeres hold on to the fibers on which they will slide up the spindle.



Then the chromosomes pull away from each other towards the centrioles on opposite sides of the cell.

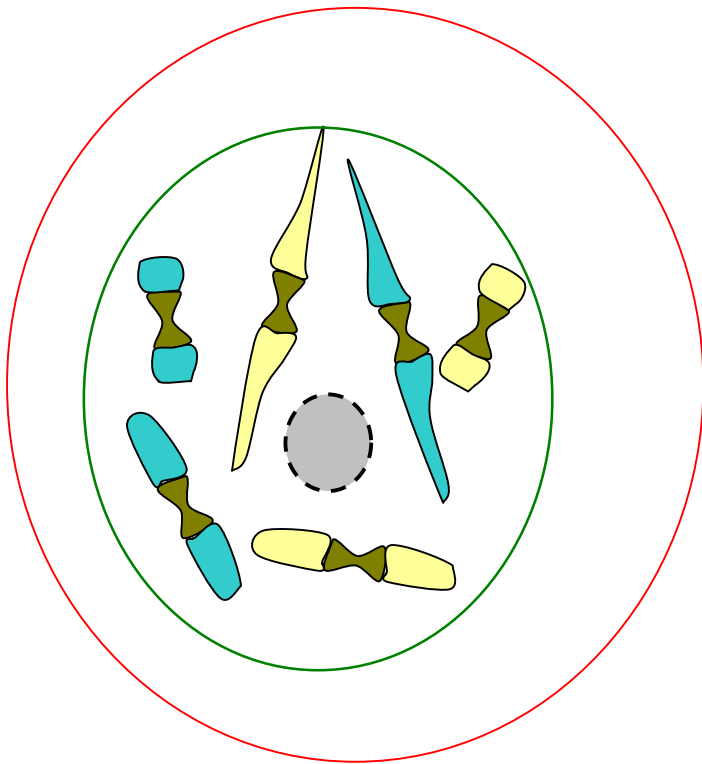
When the replication of nuclear material is complete, and the chromosomes are separated, a new cell wall forms between the sets of chromosomes. The lines from the centrioles dissolve.



Mitosis is complete:

Here are two daughter cells, each identical with the original ("mother") cell.

The nuclear walls have formed again, and the centrioles are once more hidden in centrosomes.



Centr... what?

The centrioles
Move to the poles.



The centromere
says, "Grab me
here."



The centrosome
is the centriole home.

