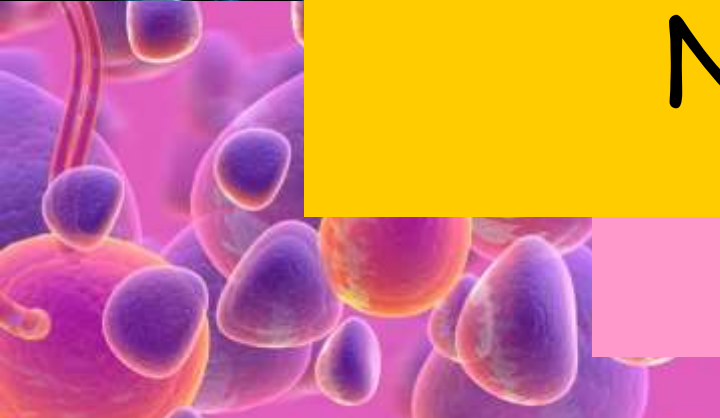
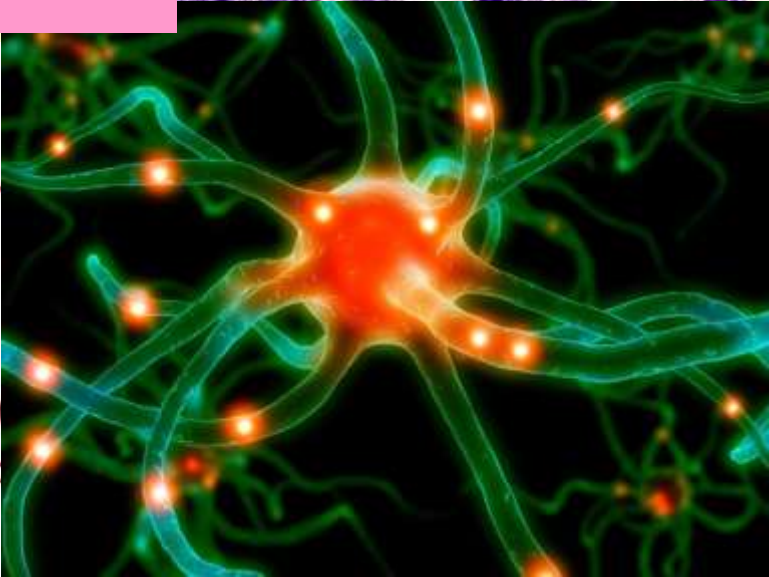
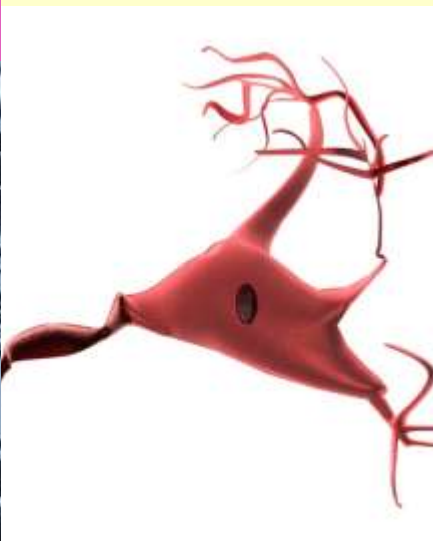
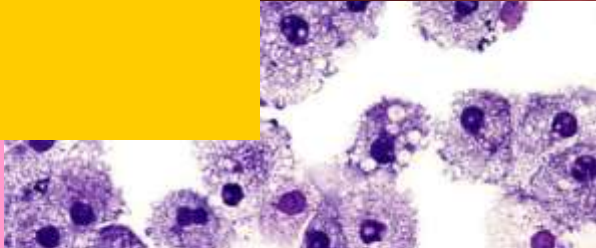


National 5



Cells 3



Mitosis

Cell division is a means of increasing the number of cells in an organism.

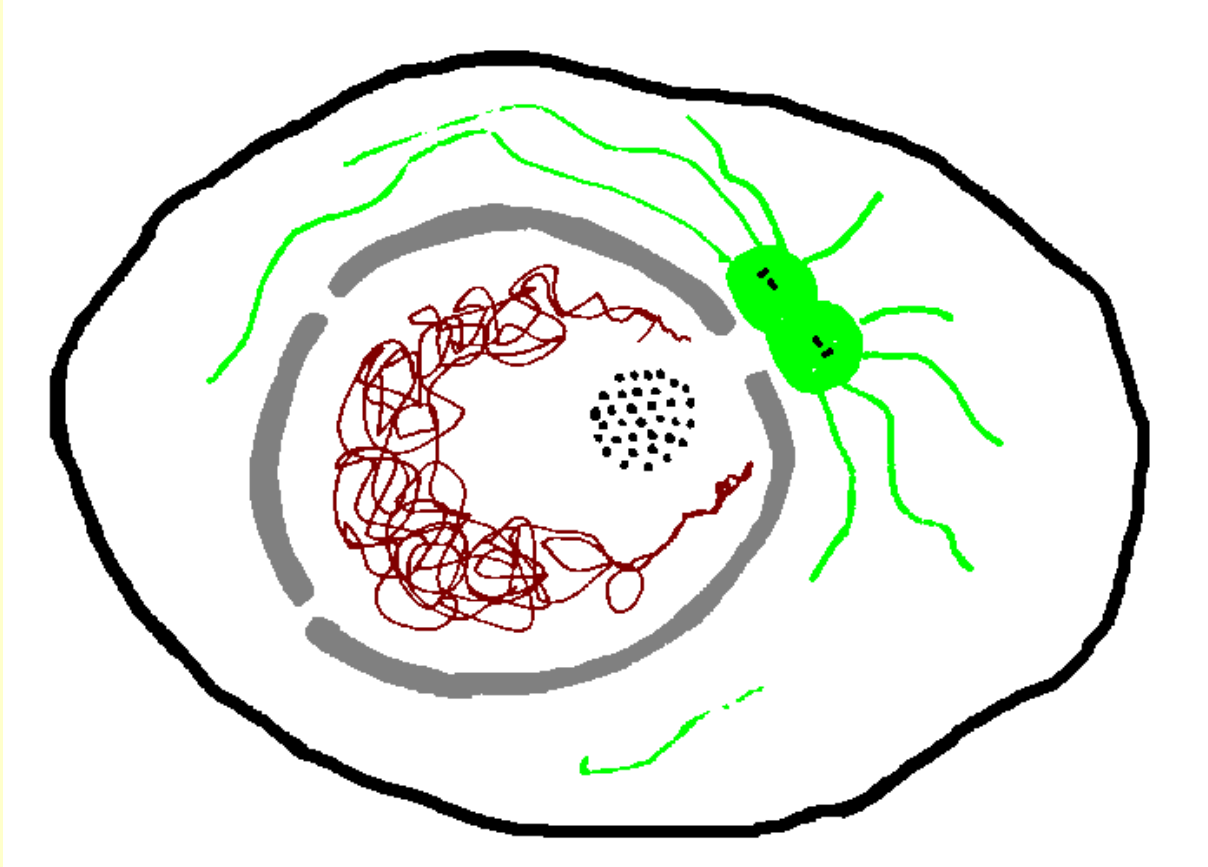
Single celled organisms use cell division as a way of reproducing asexually.

Multi- cellular organisms use cell division as a way of producing more cells for growth and repair.

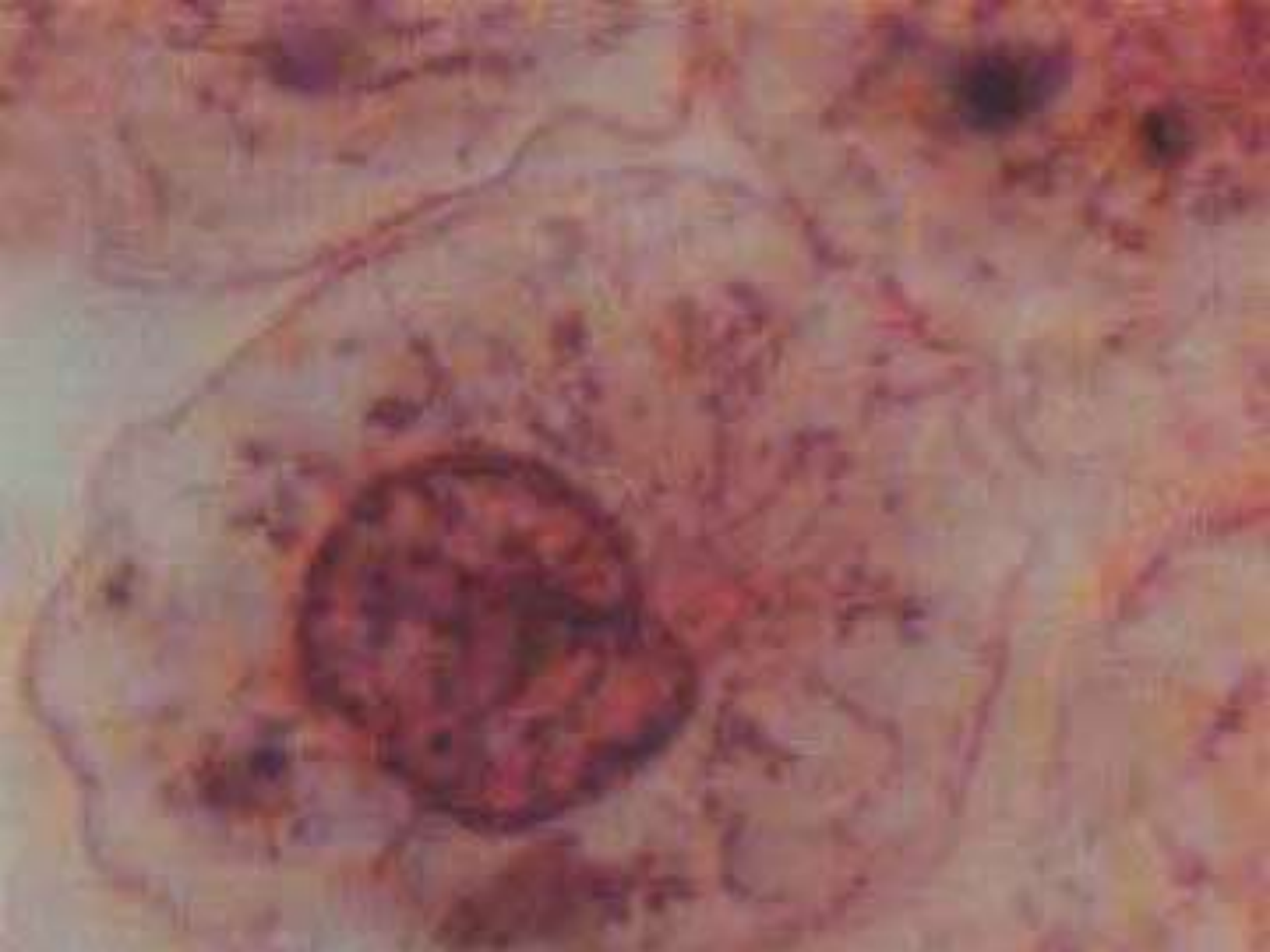
The nucleus of the cell controls cell activities including division.

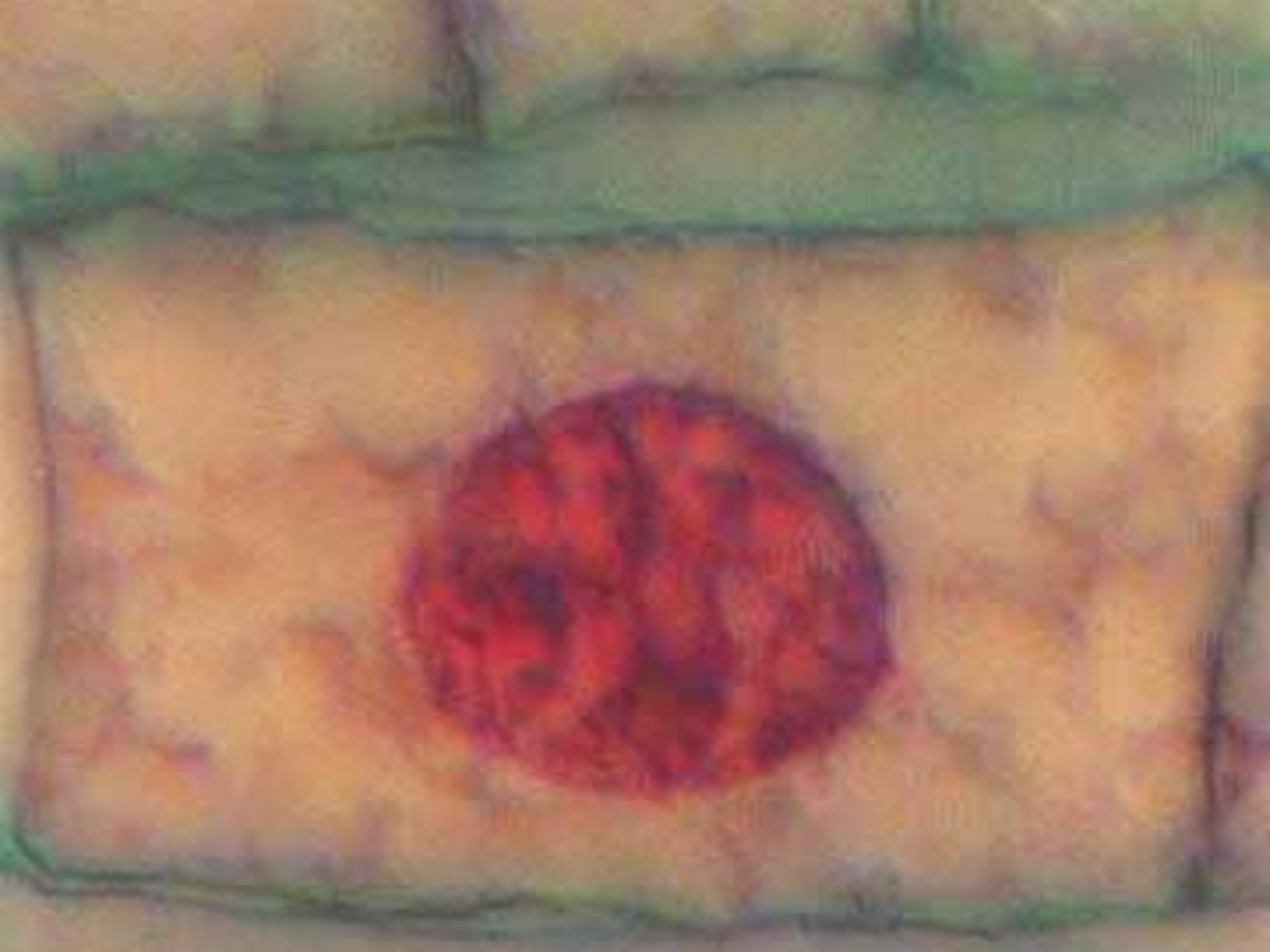
lets look at these stages

Stage 1

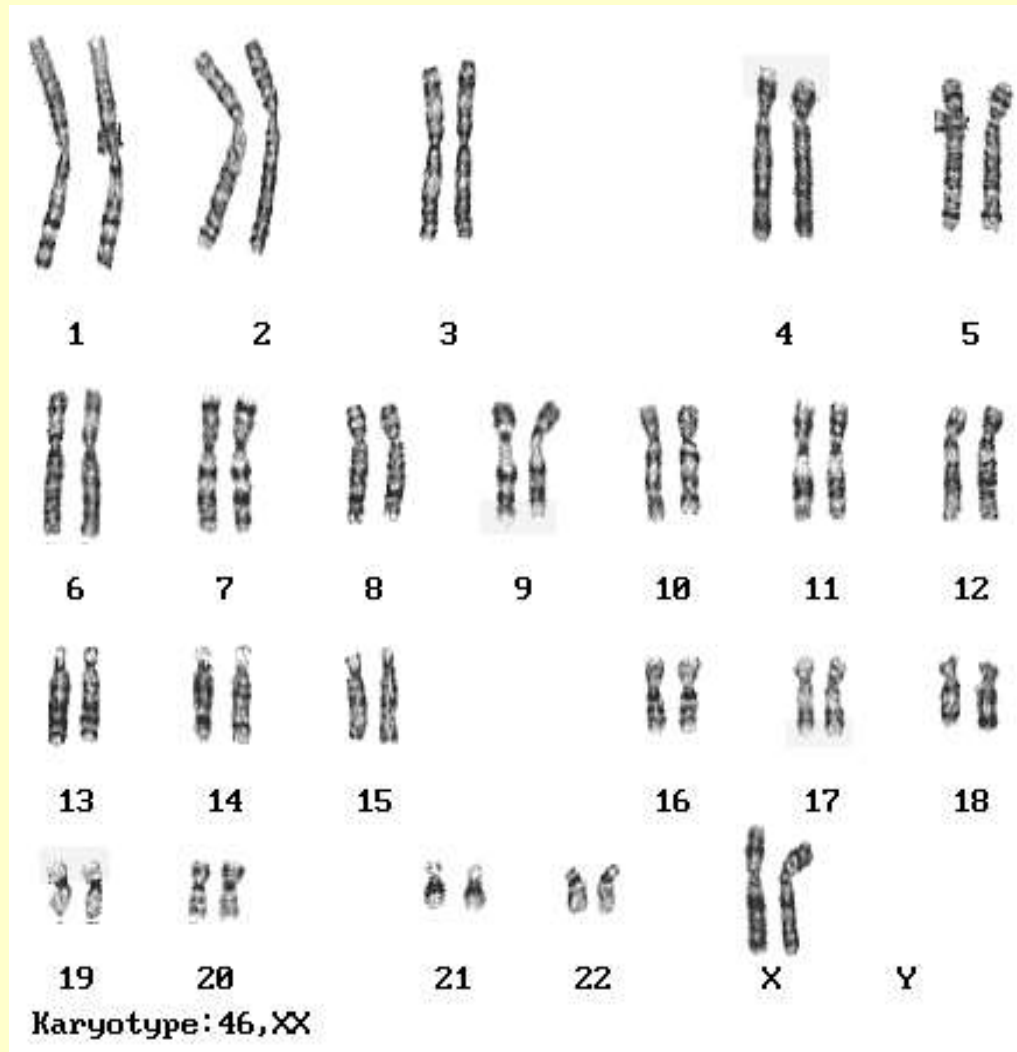


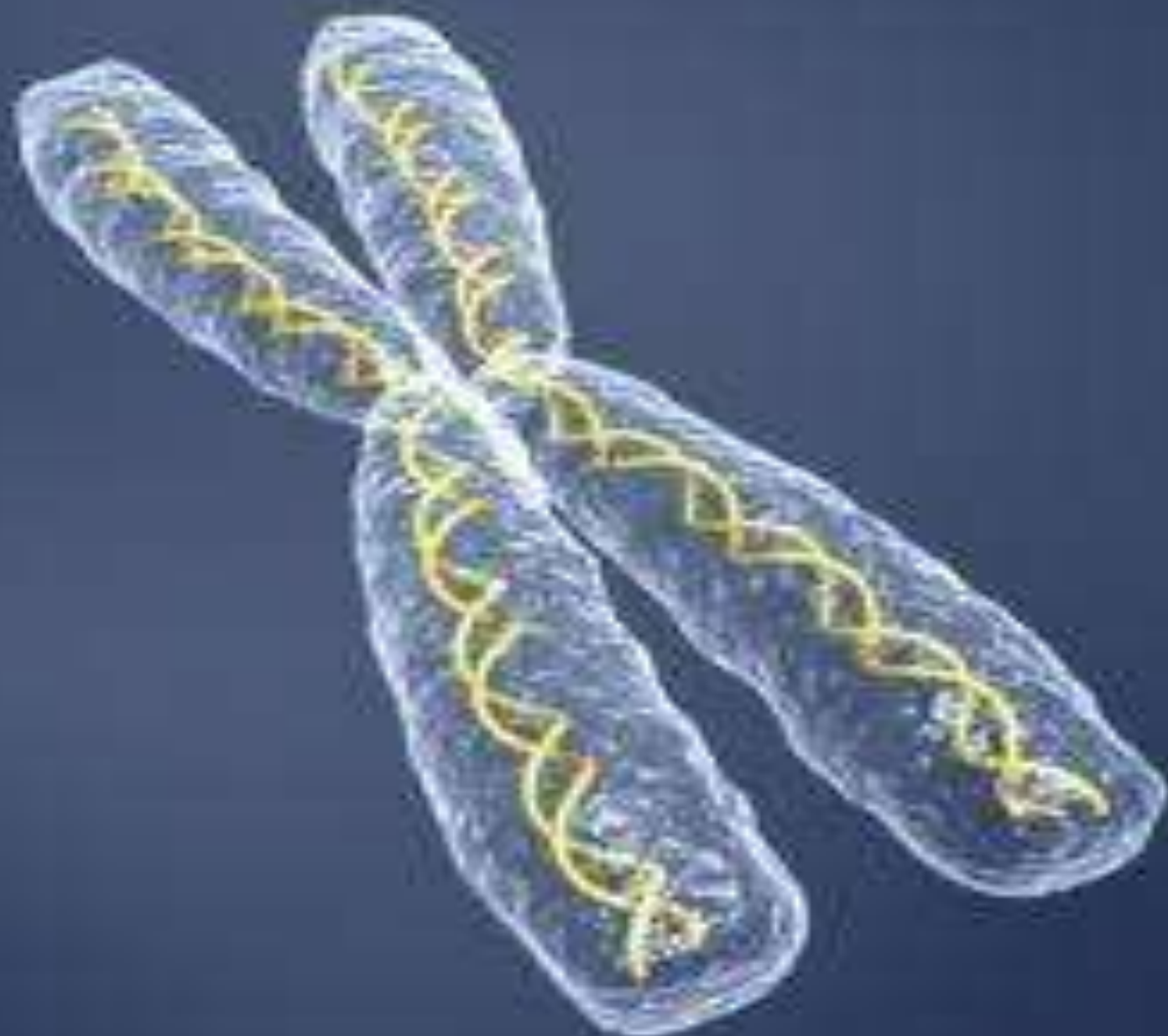
No chromosomes are visible but chromosomes are replicating themselves





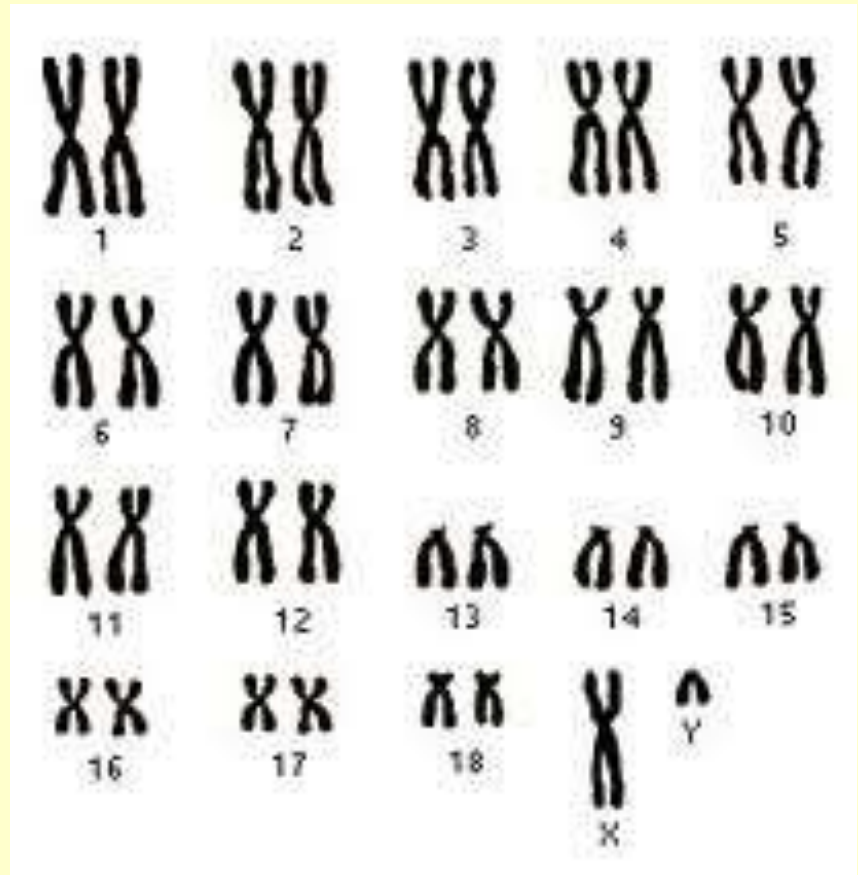
Before Replication





After Replication

- Each chromosome is now made of 2 identical chromatids joined at a centromere

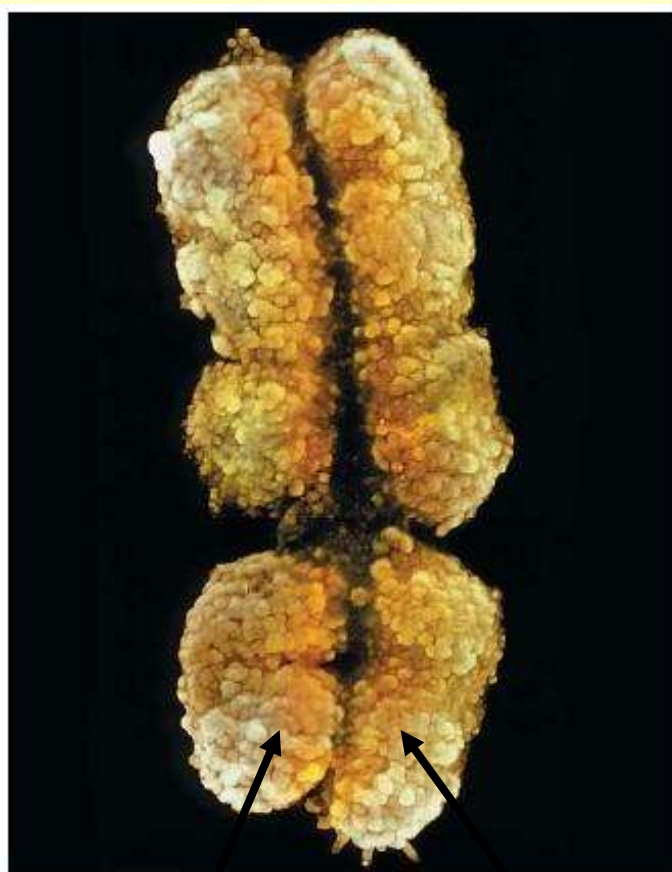


Each species of plant or animal has a specific number of chromosomes in their cells - humans have 46



Structure of Chromosomes

Genes



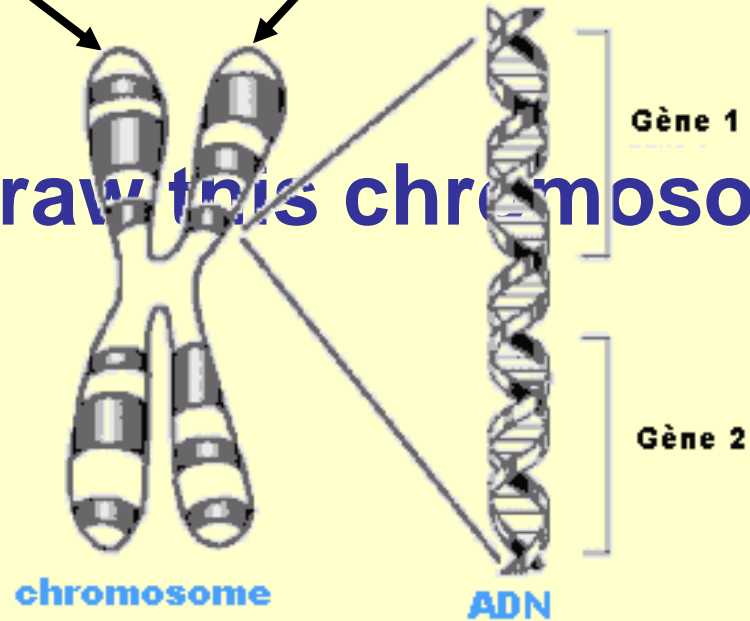
Chromatid 1

Chromatid 2

Chromatid 1

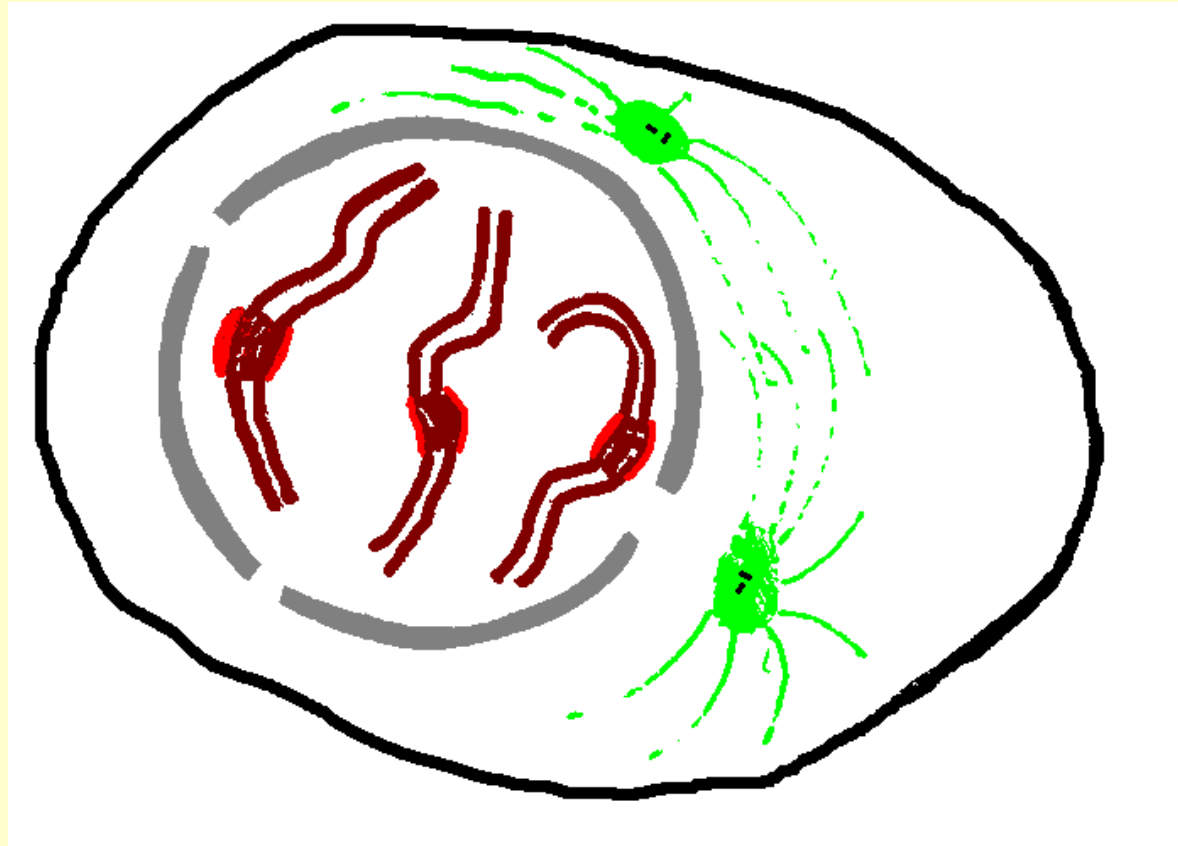
Chromatid 2

Draw this chromosome



A chromosome has two identical halves called chromatids joined at a central point.

Stage 2

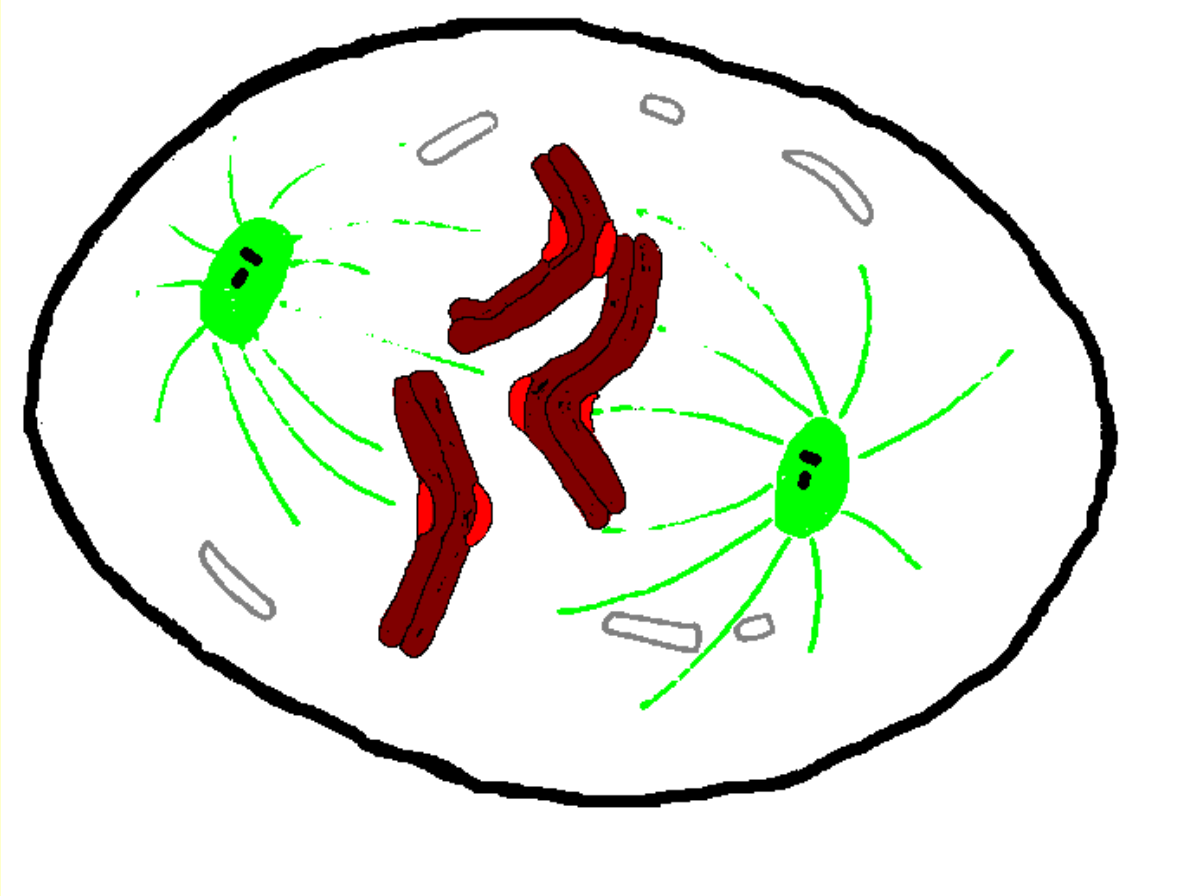


- **chromosomes coil and appear inside nucleus**

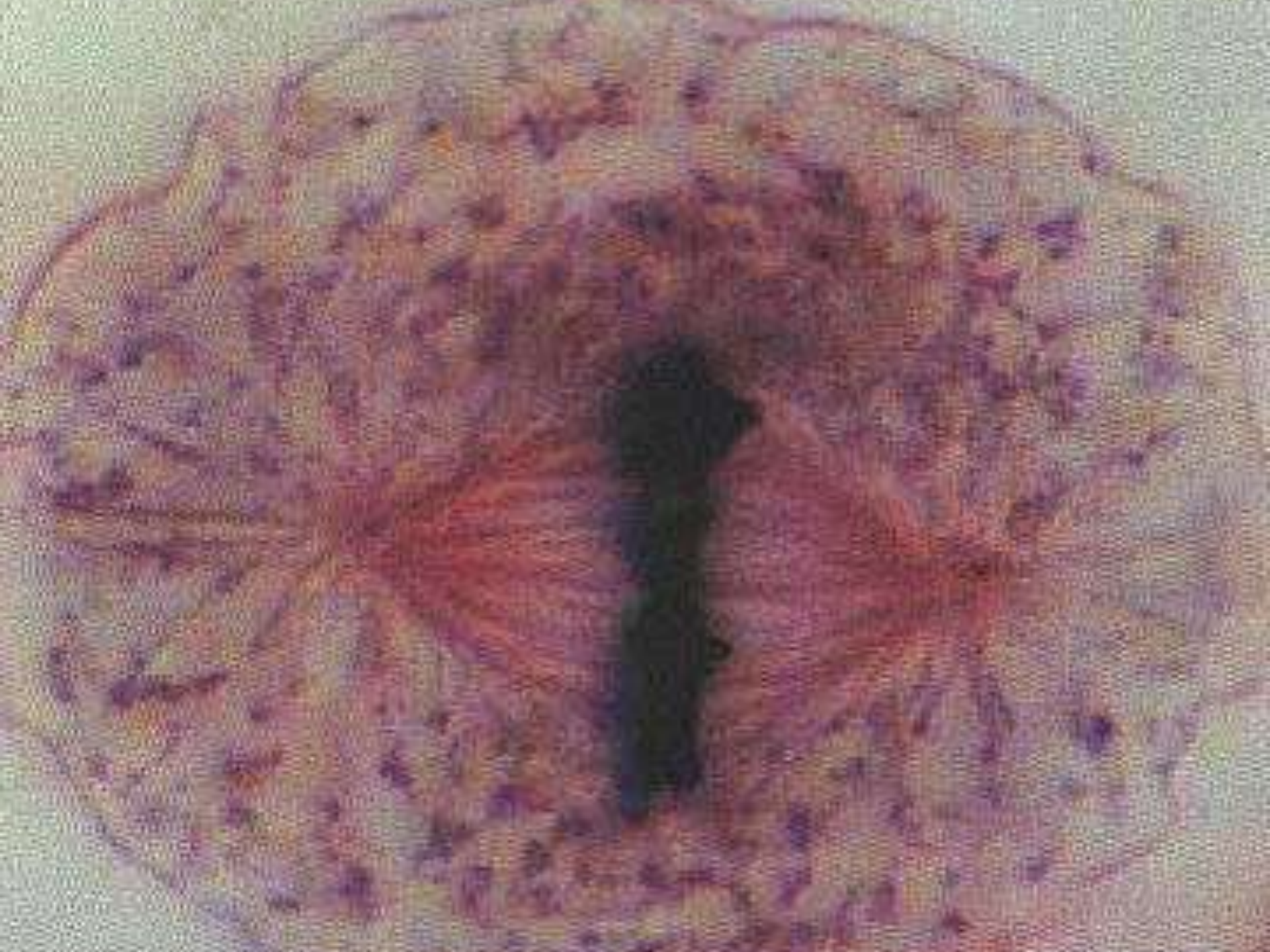


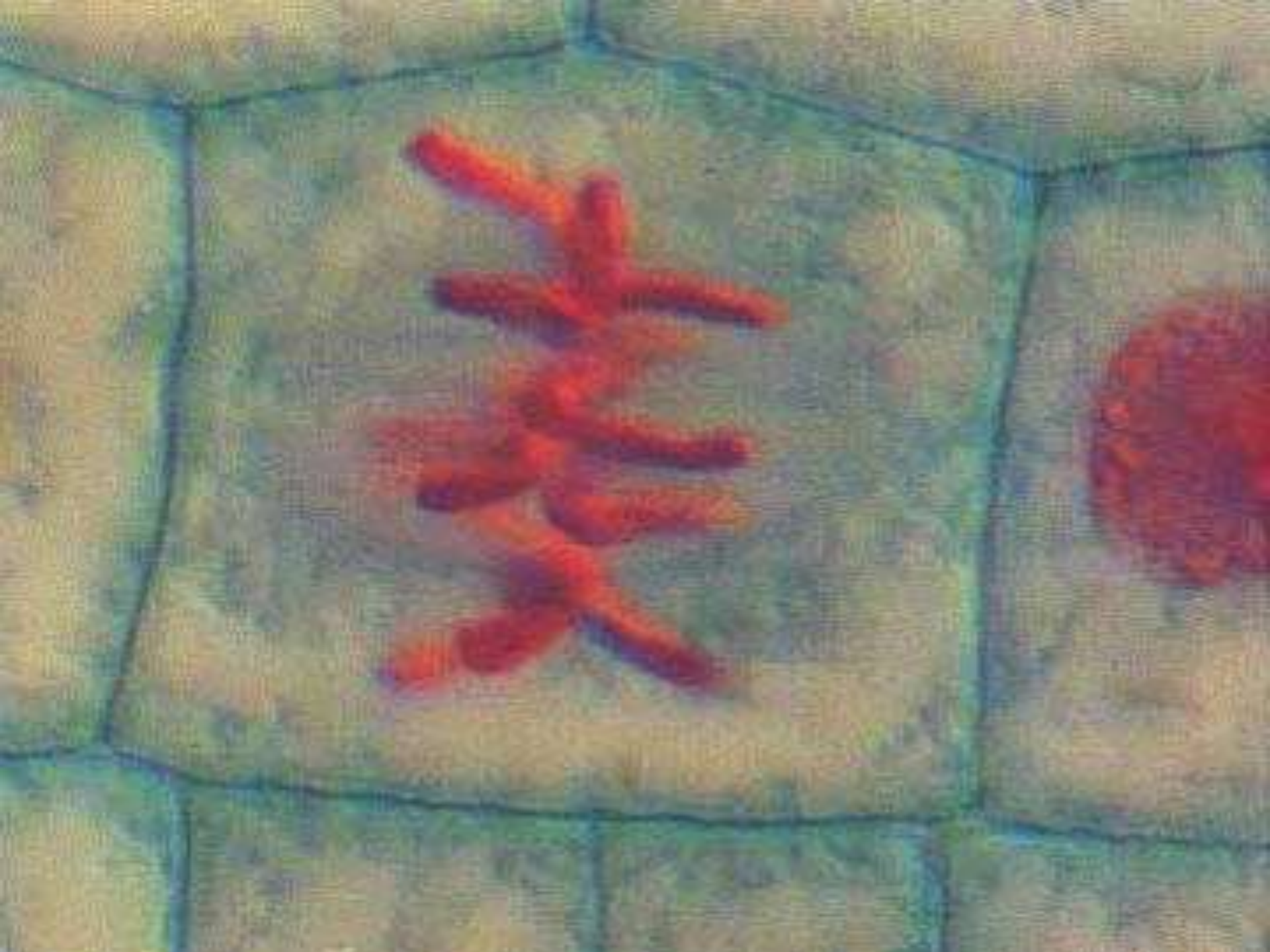


Stage 3.

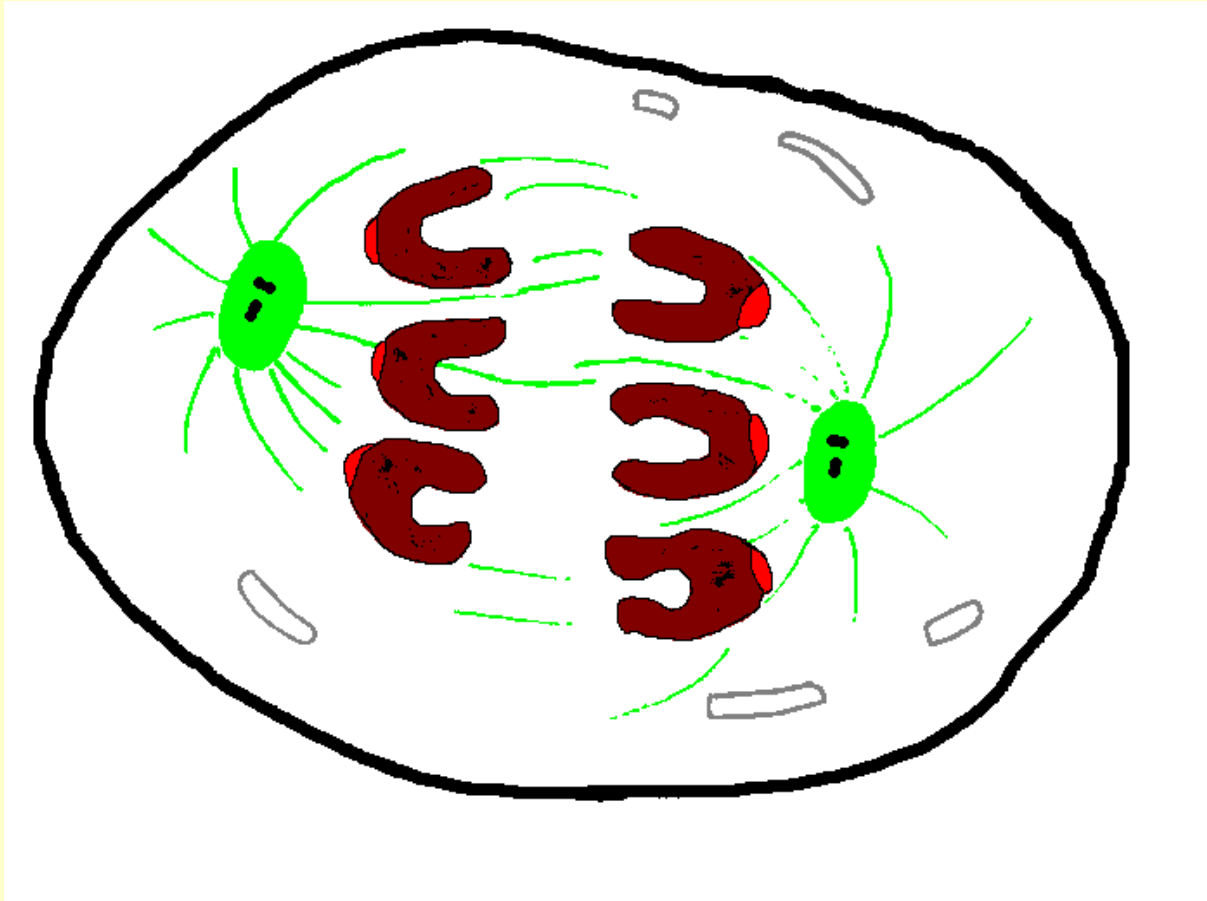


- The chromosomes are lined up along the equator by spindle fibres

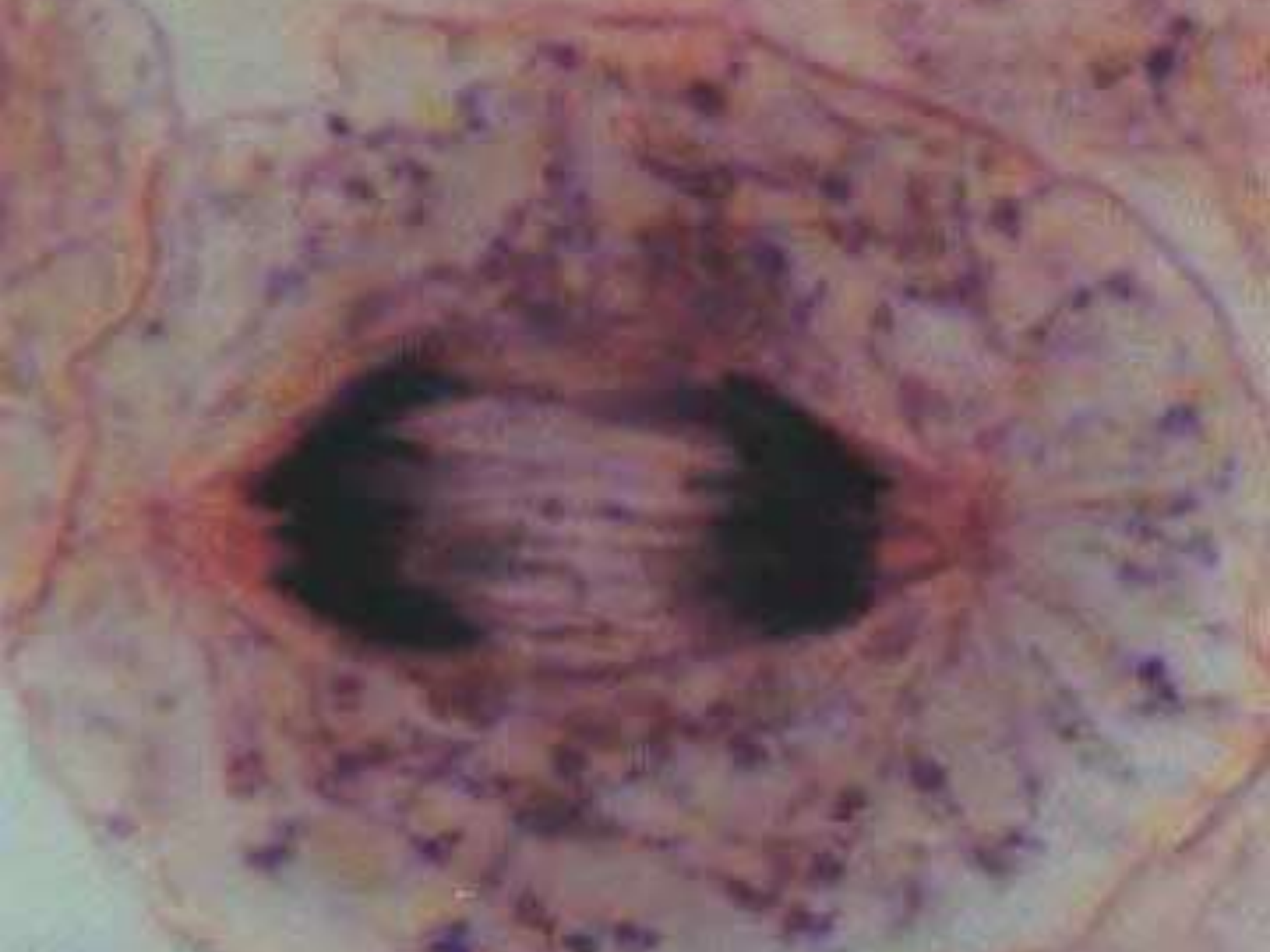


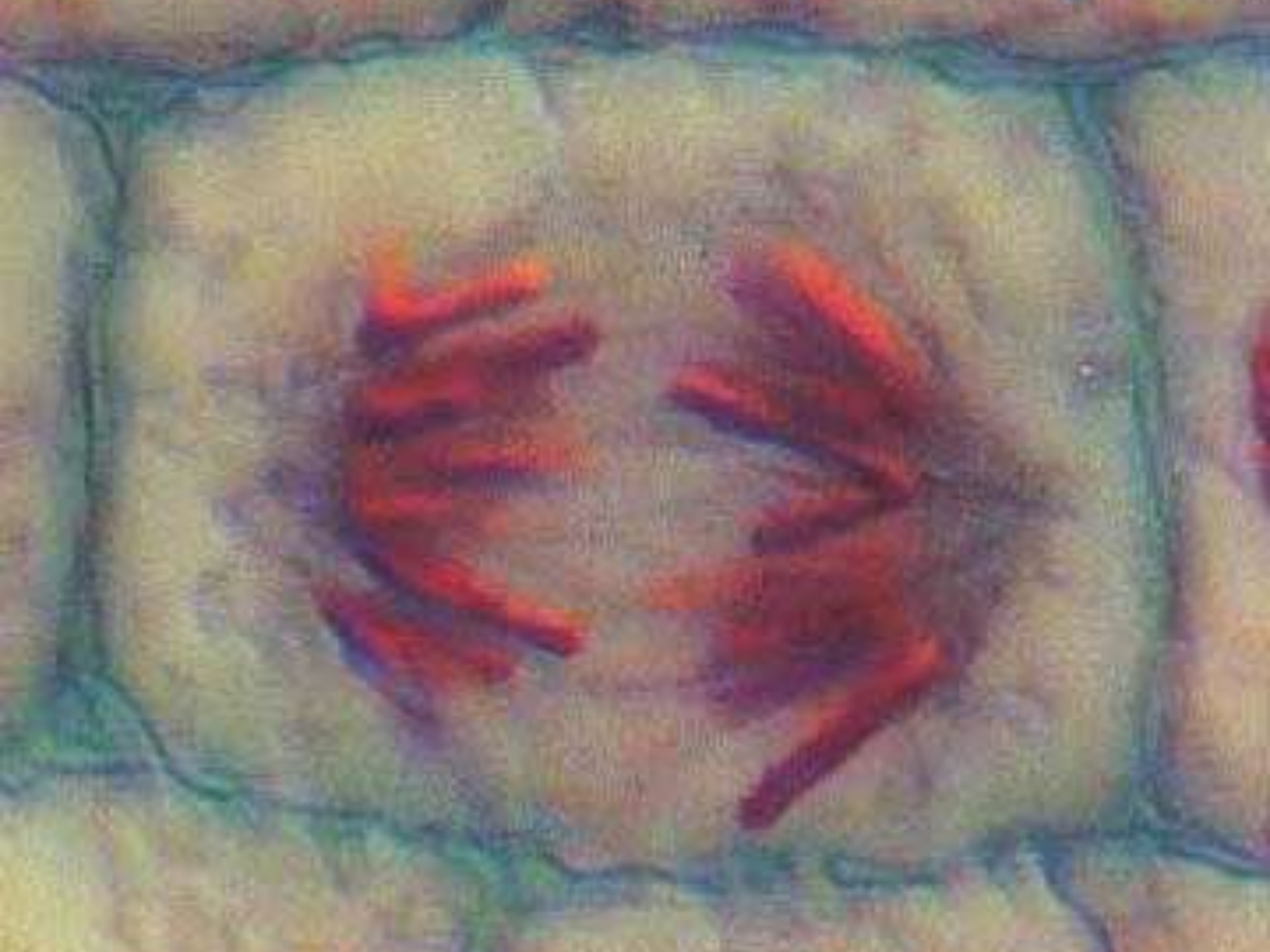


Stage 4.

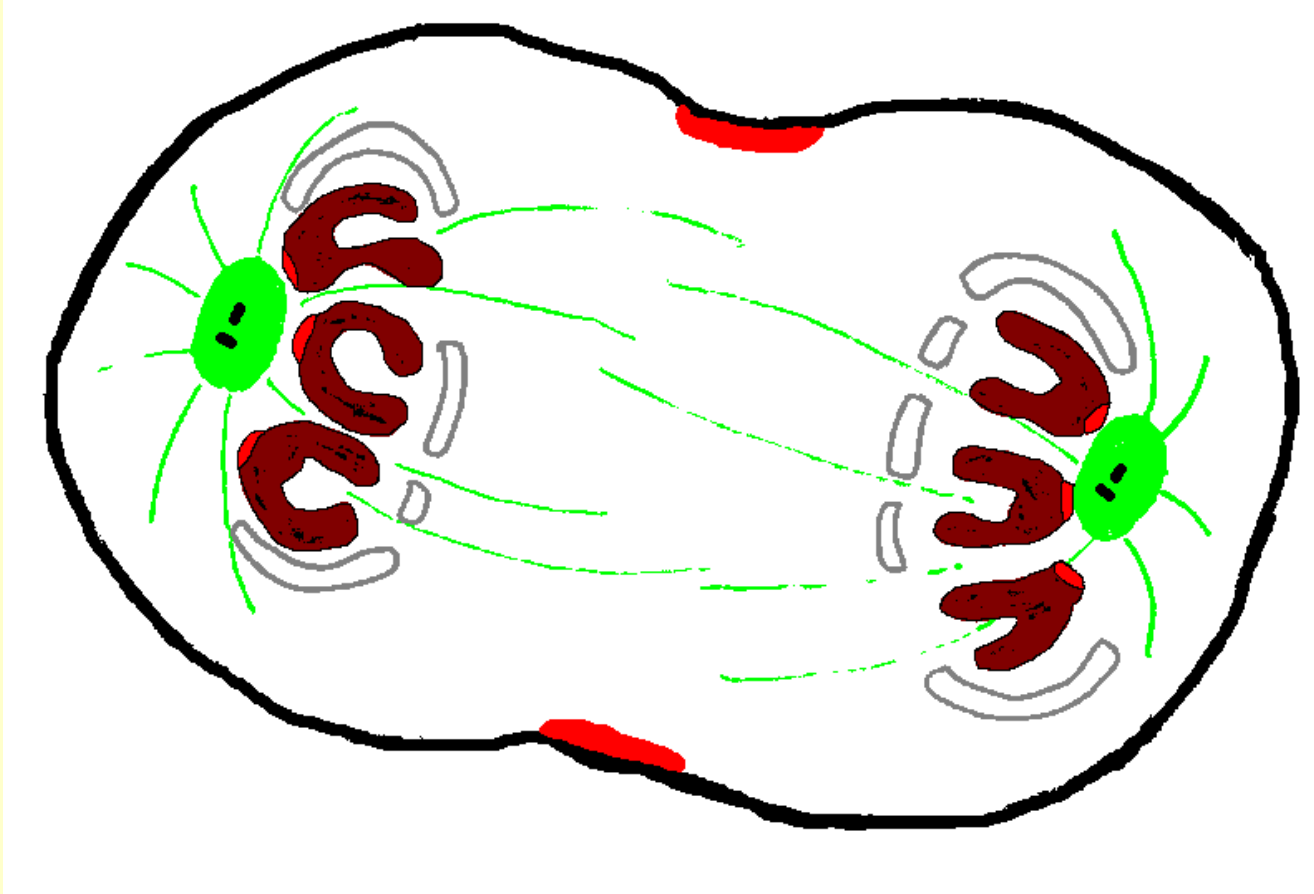


- The chromosomes are separated and pulled to opposite sides (poles) by the spindle fibres.

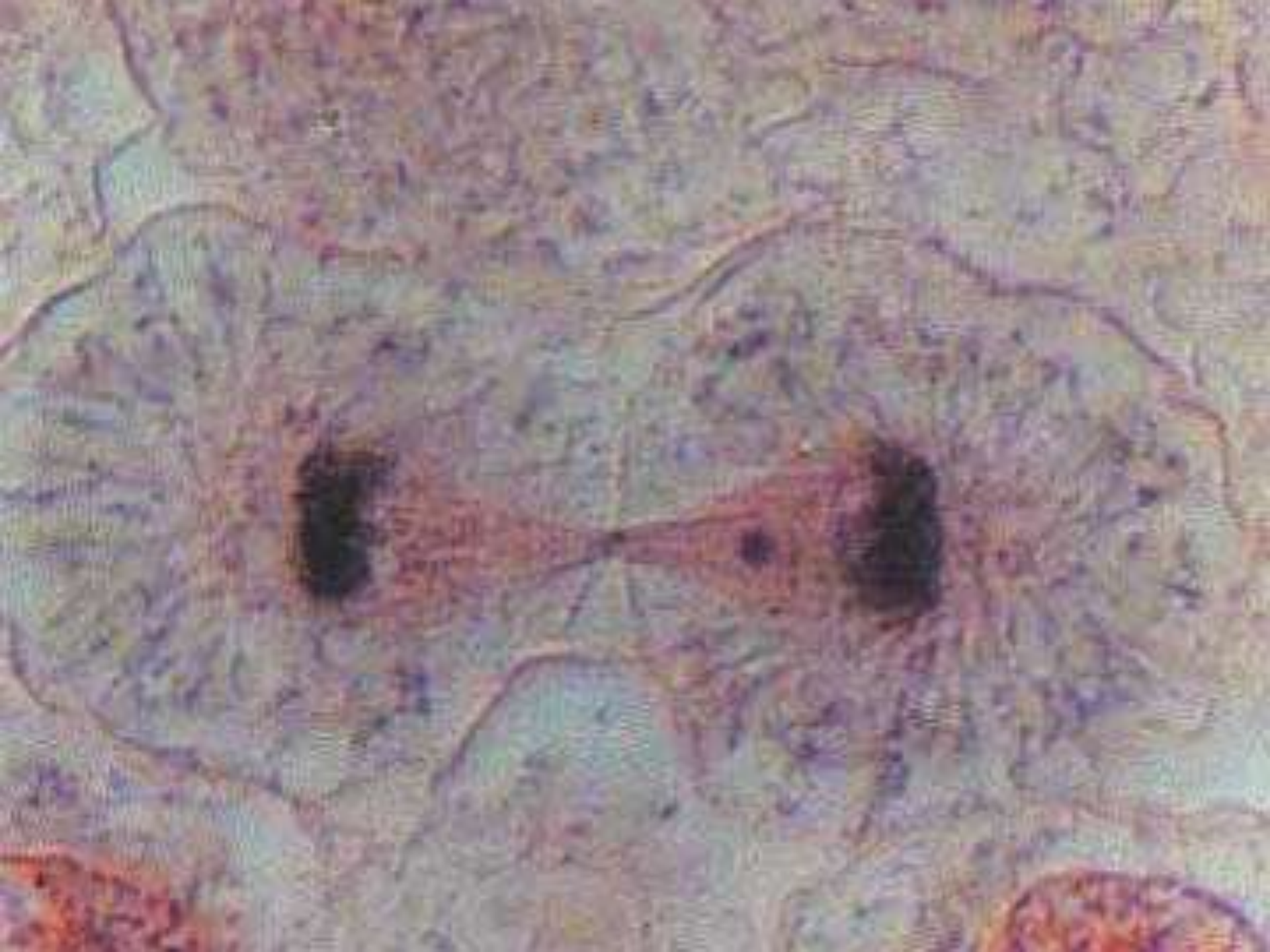




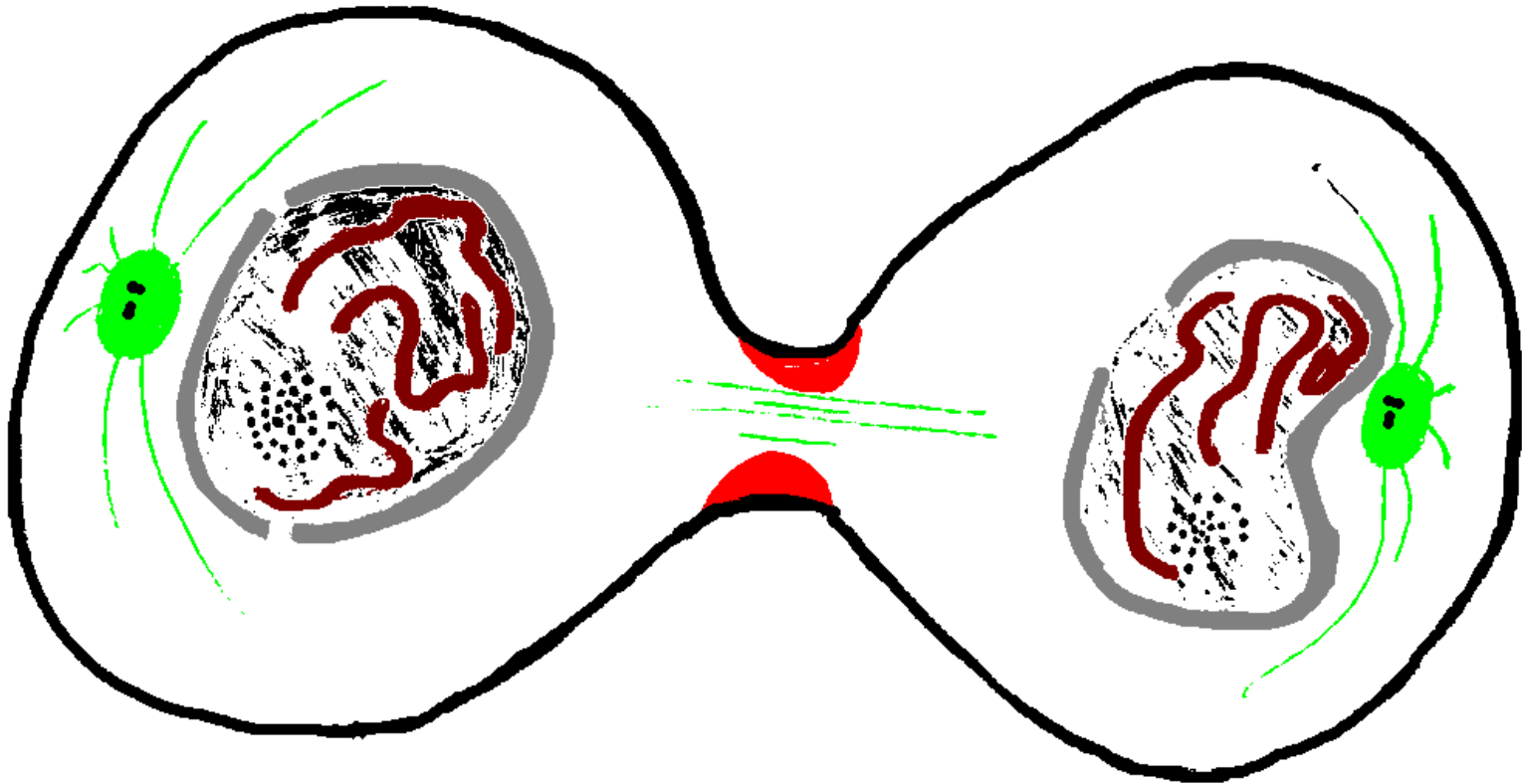
Stage 5.



- The two sets of identical chromatids arrive at the poles

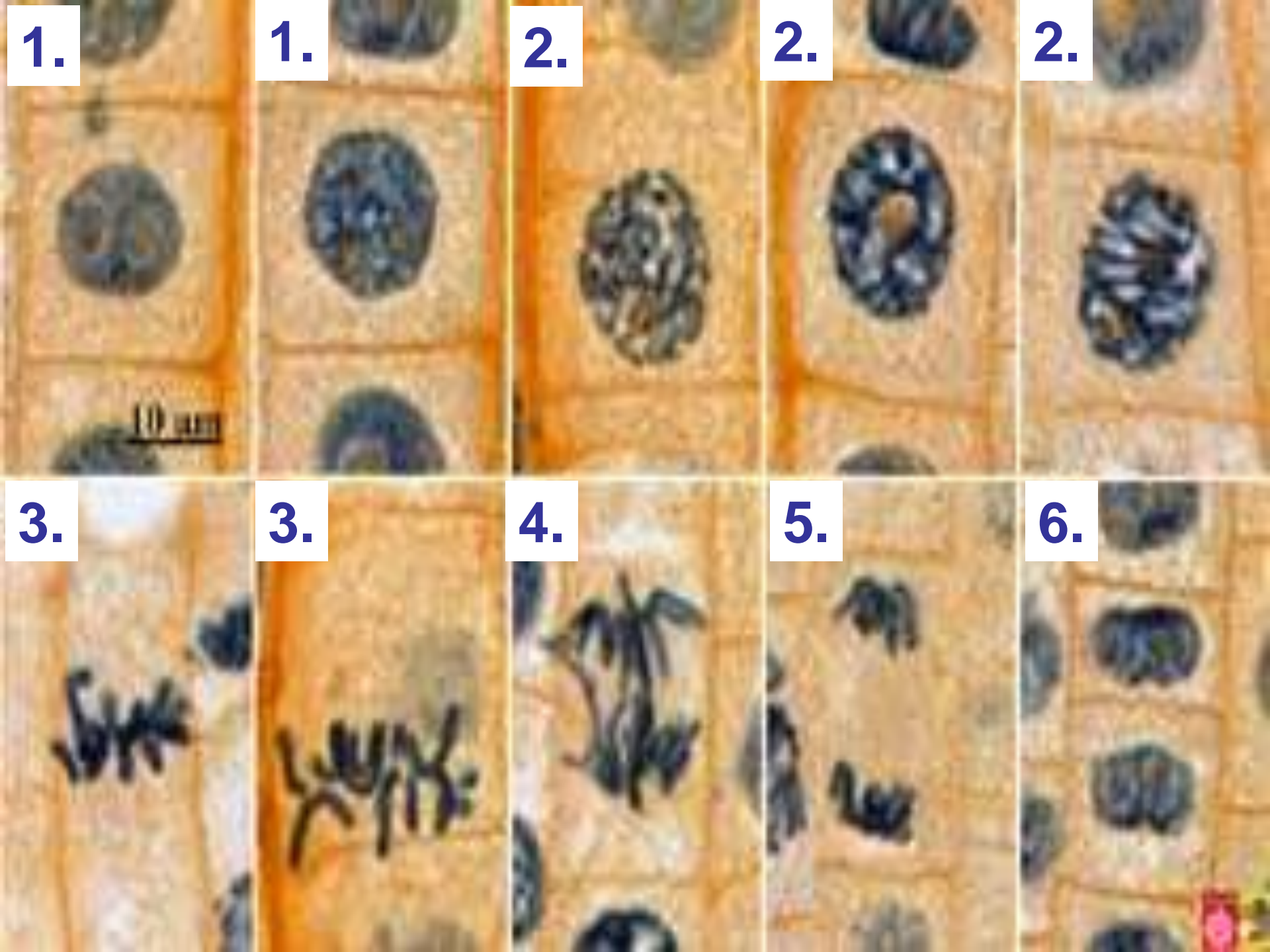


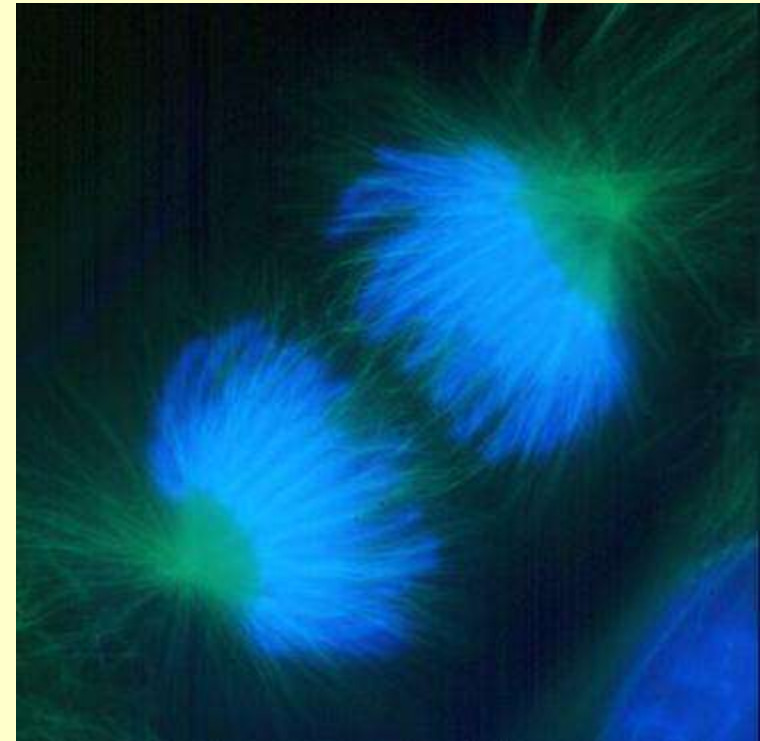
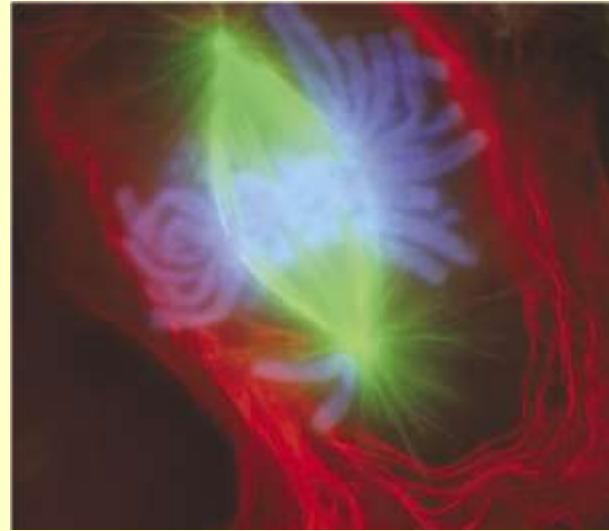
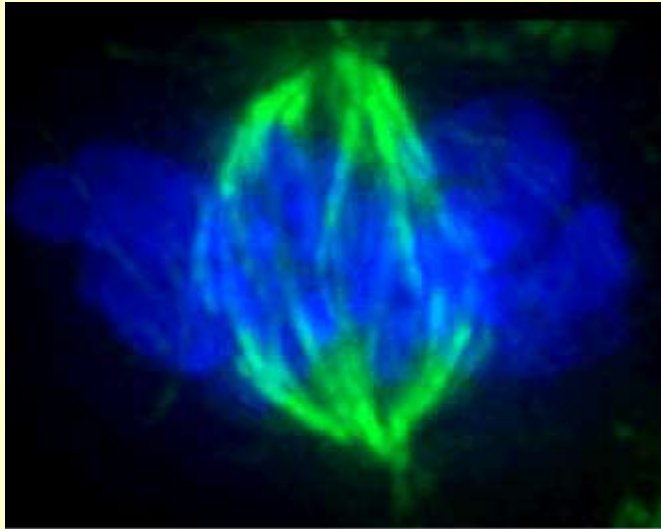
Stage 6.



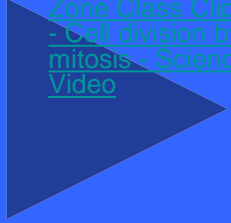
**Nuclear membrane reforms around each sets of chromosomes and the cytoplasm divides
Two identical daughter cells are produced.**







- [BBC - Learning Zone Class Clips - Cell division by mitosis - Science Video](#)



Put these mitosis pictures in order

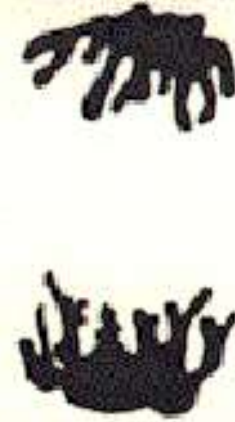
1



2



3



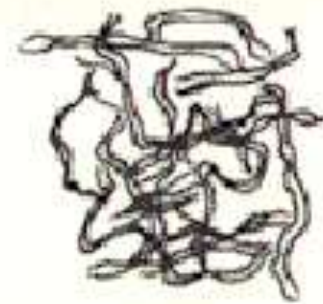
4



5



6



Correct sequence



2



6



4



1



3



5



Chromosome Complement (number)

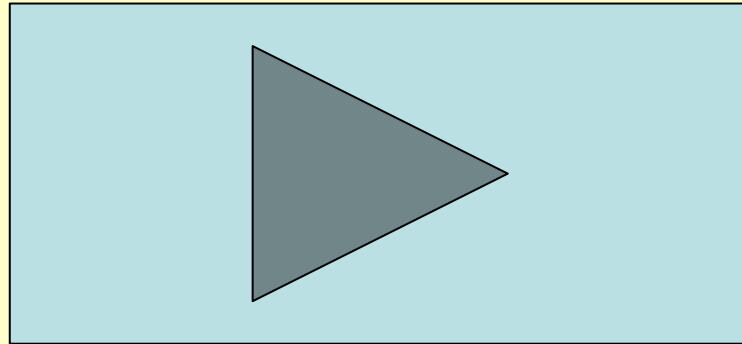
- After cell division, the two new daughter cells contain the same number of chromosomes to the original parent cell.
- This is important so no genetic information is lost.

Collect diagram &
statements

Diploid Cells

- Most cells contain 2 sets of chromosomes. These are called diploid (*double*) cells.
- Sex cells (*gametes*) are the only cells that contain half the number of chromosomes in comparison. They are described as haploid (*half*) cells.
- Red Blood Cells have no nucleus so contain **no chromosomes**

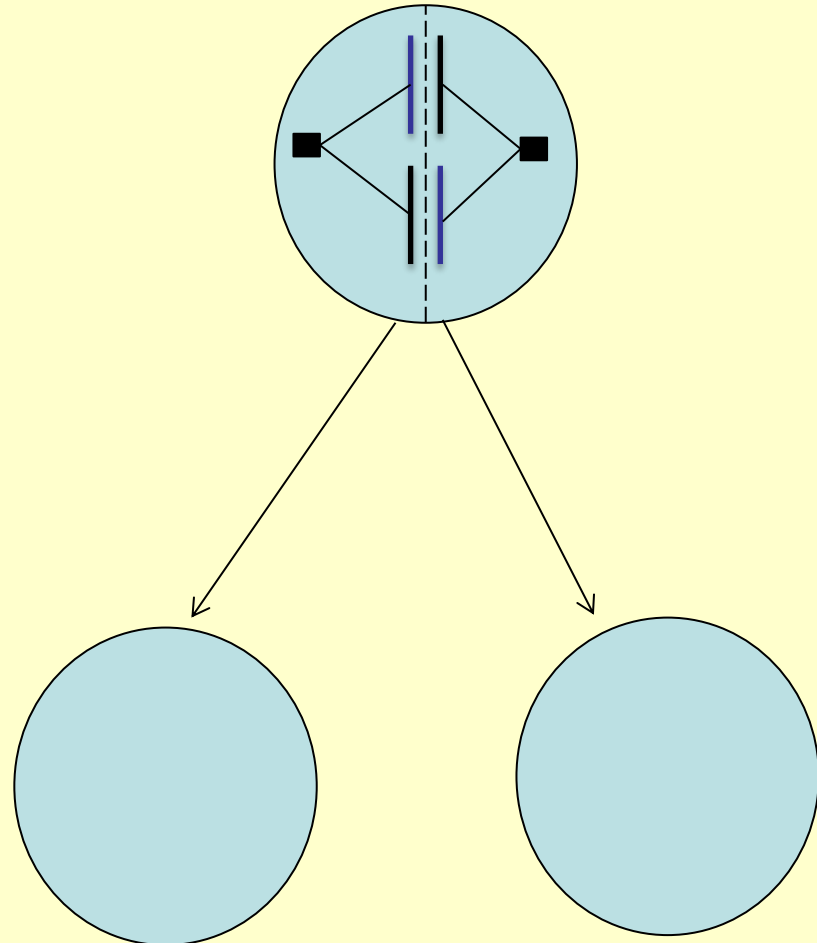
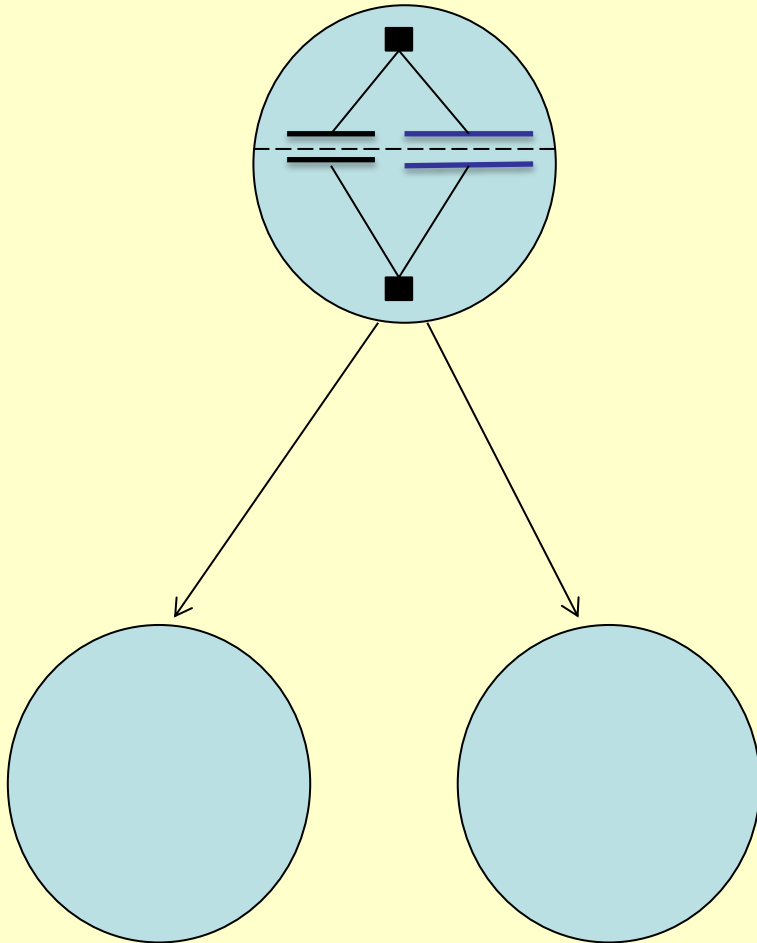
Uncontrolled Cell Division - Cancer



Practice Questions

- If a cell divides every 30 minutes, how many new cells would be produced after 4 hours?

Practice Questions



Culturing Cells by Mitosis

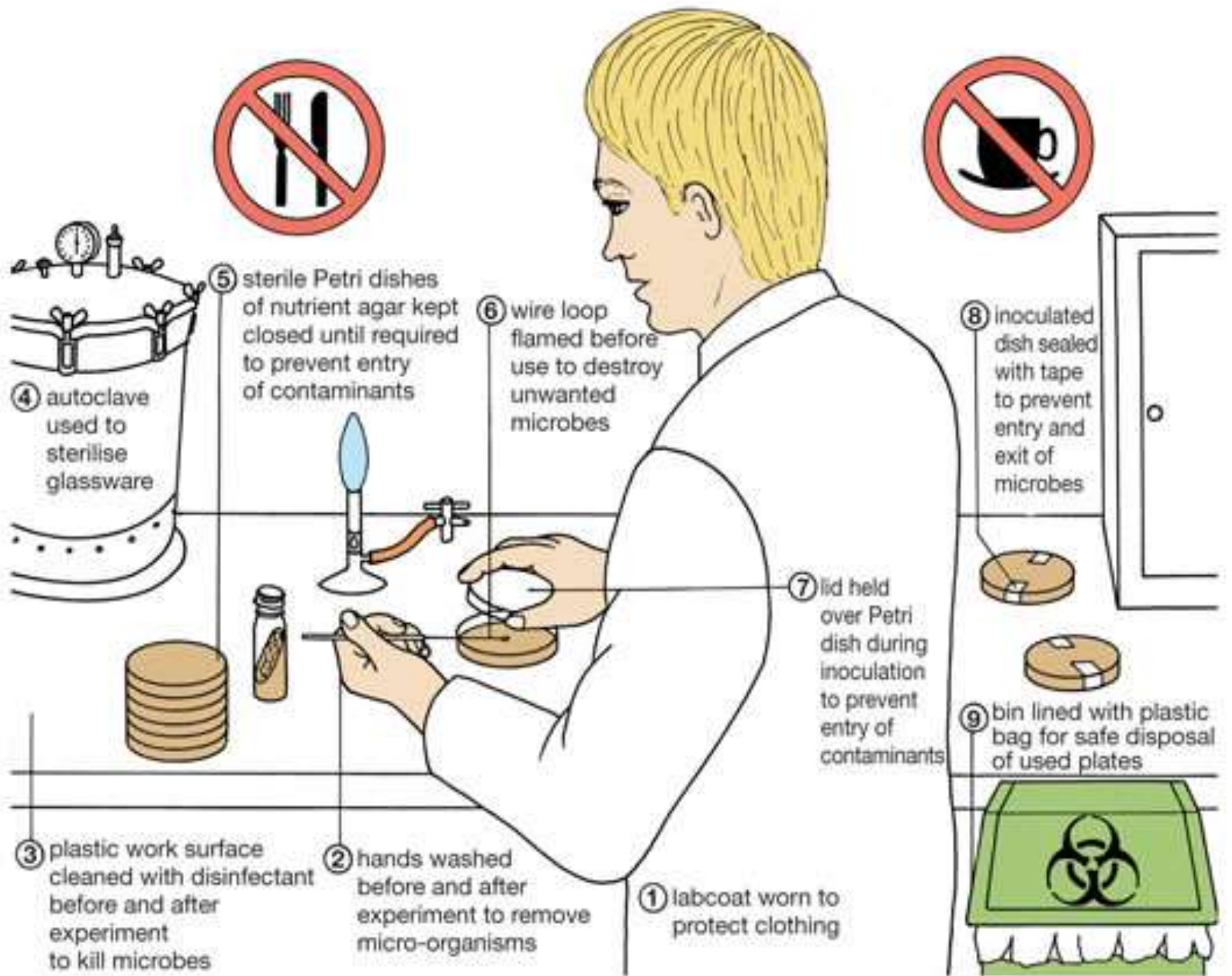
- Learning outcome:
 1. To be able to carry out aseptic techniques to culture cells in the laboratory.

Culturing Cells

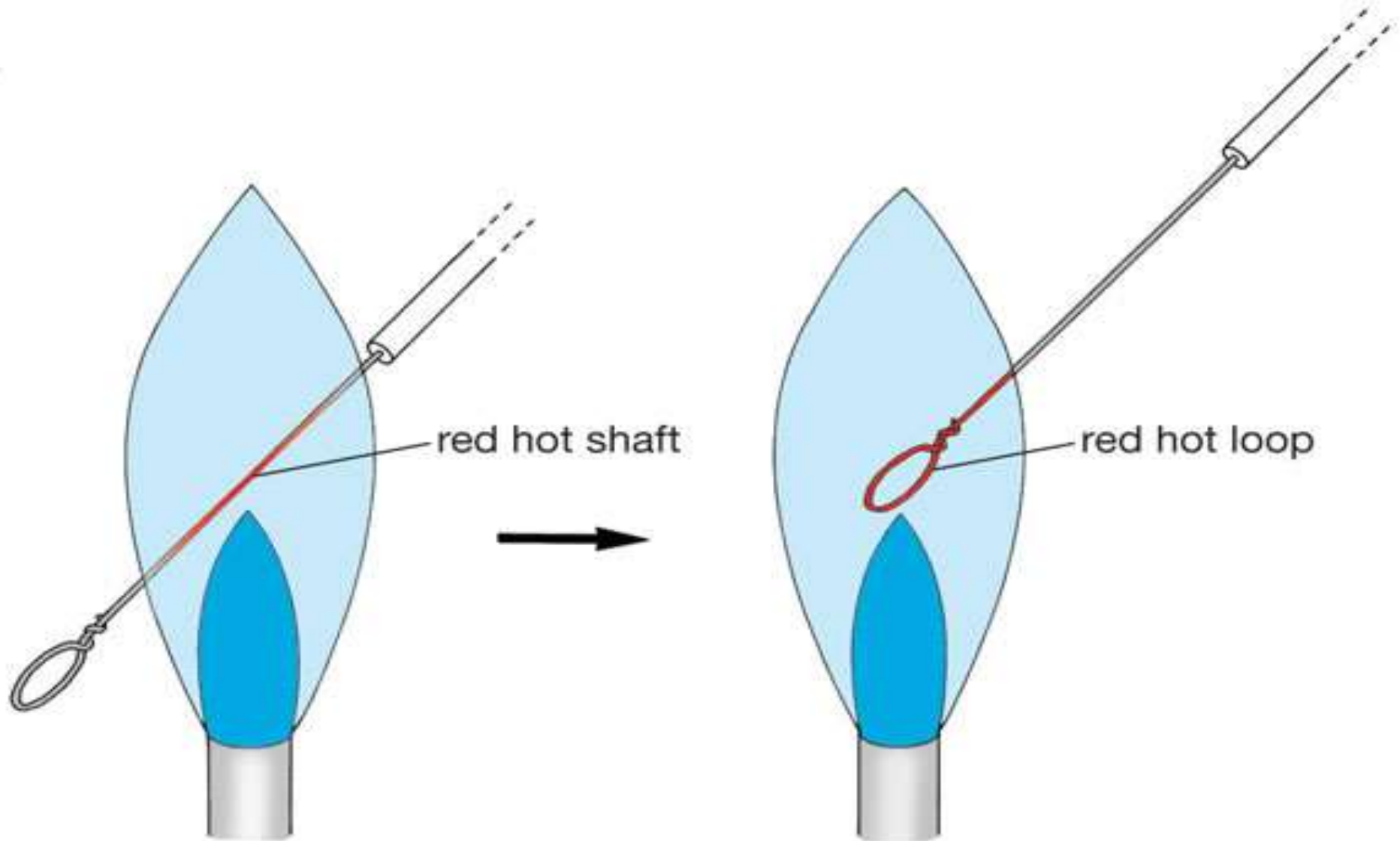
- When a supply of a certain type of cell is required, cultures of the cell may be grown.
- For example:
 1. Fungus to produce antibiotics;
 2. Yeast for bread making and beer/wine making;
 3. Bacteria producing Insulin

Cultures

- Certain precautions must be taken when working with micro-organisms in the laboratory.
- Aseptic (sterile) conditions are required to prevent the growth of **unwanted airborne microbes** in the culture.



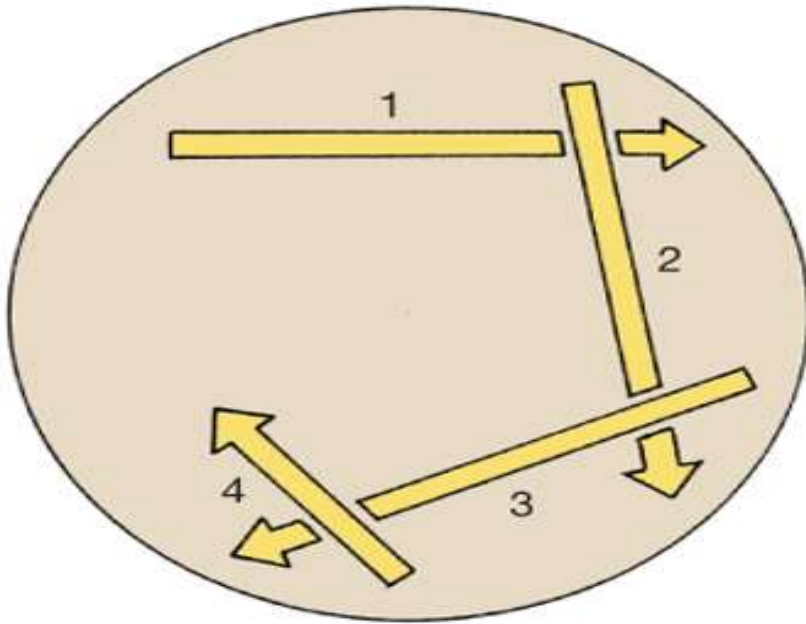
Flaming the loop

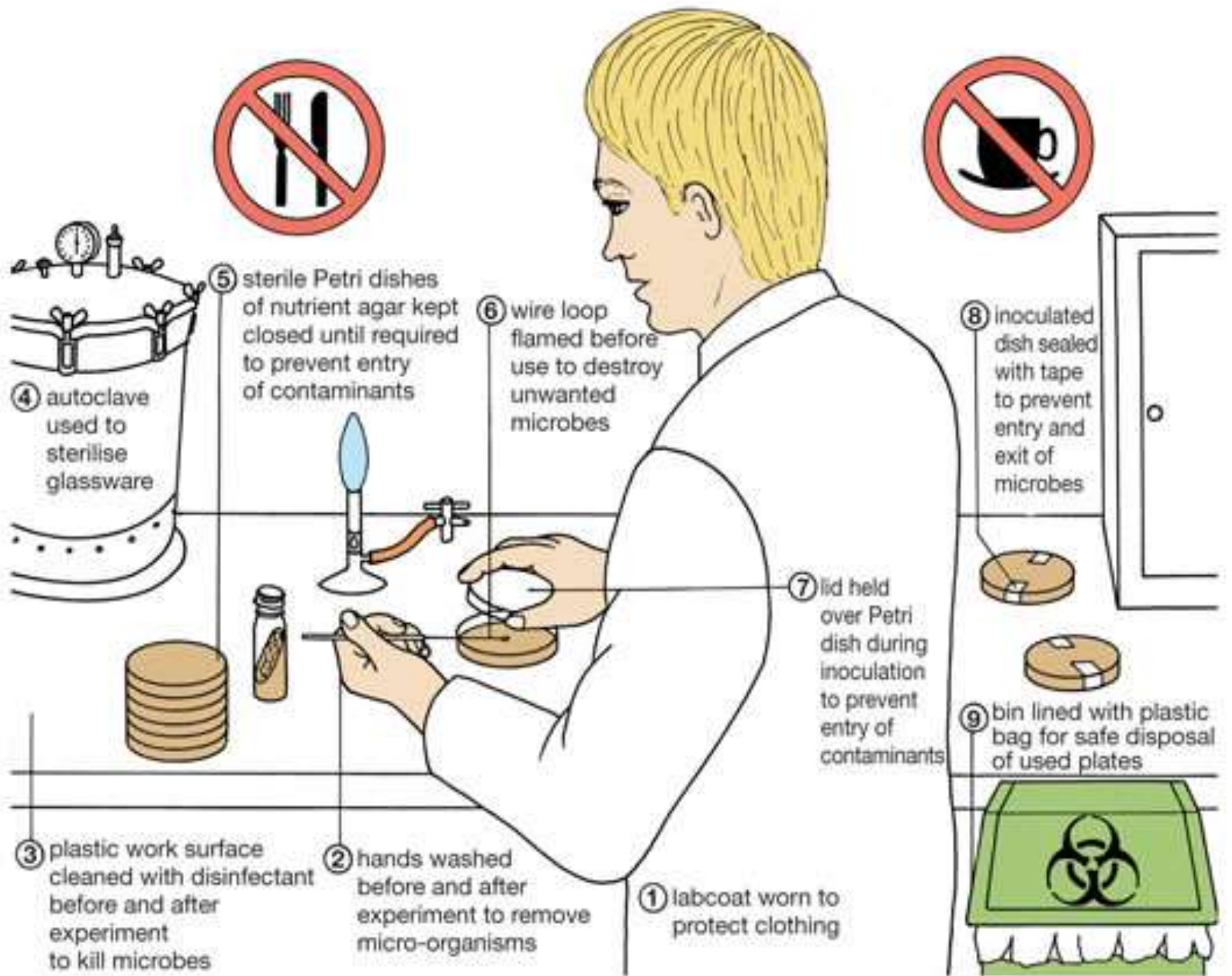


Flaming the Bottle Neck



Streak Plate





Cell Culture Requirements

1. **Sterile environment** free from contaminants
2. An appropriate **growth medium** that contains **glucose** and **nutrients** for mitosis to occur
3. A controlled environment to provide **optimum conditions** for growth (temperature, oxygen levels, pH)

Therapeutic Use of Human Stem Cells

- Human stem cells can be cultured in the laboratory and used to produce replacement organs.

