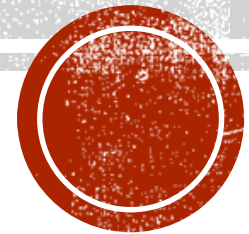


# CELL DIVISION

Mitosis to meiosis and everything in between



# WHAT IS CELL DIVISION

- All cells come from existing cells
- Cells do not reproduce like other organismic. They divide
- The four types of cell division you will learn are: Binary Fission, budding, Mitosis, and Meiosis.



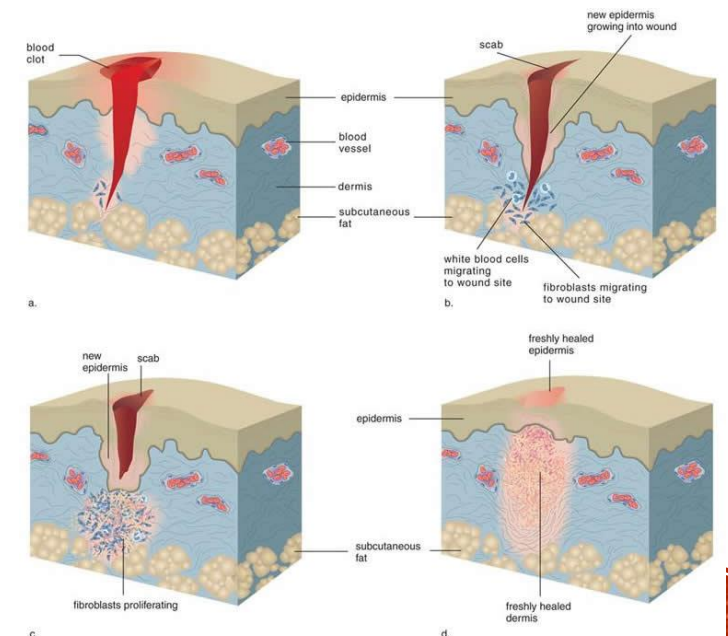
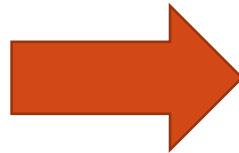
# DIFFERENCE BETWEEN UNICELLULAR AND MULTICELLULAR ORGANISMS

- In Unicellular organism, cell division is used for reproduction.
  - Prokaryote cells
  - Binary fission
  - budding
- In Multicellular organisms use cell division for both reproduction and growing and repairing
  - Eukaryote cells
  - Mitosis and meiosis



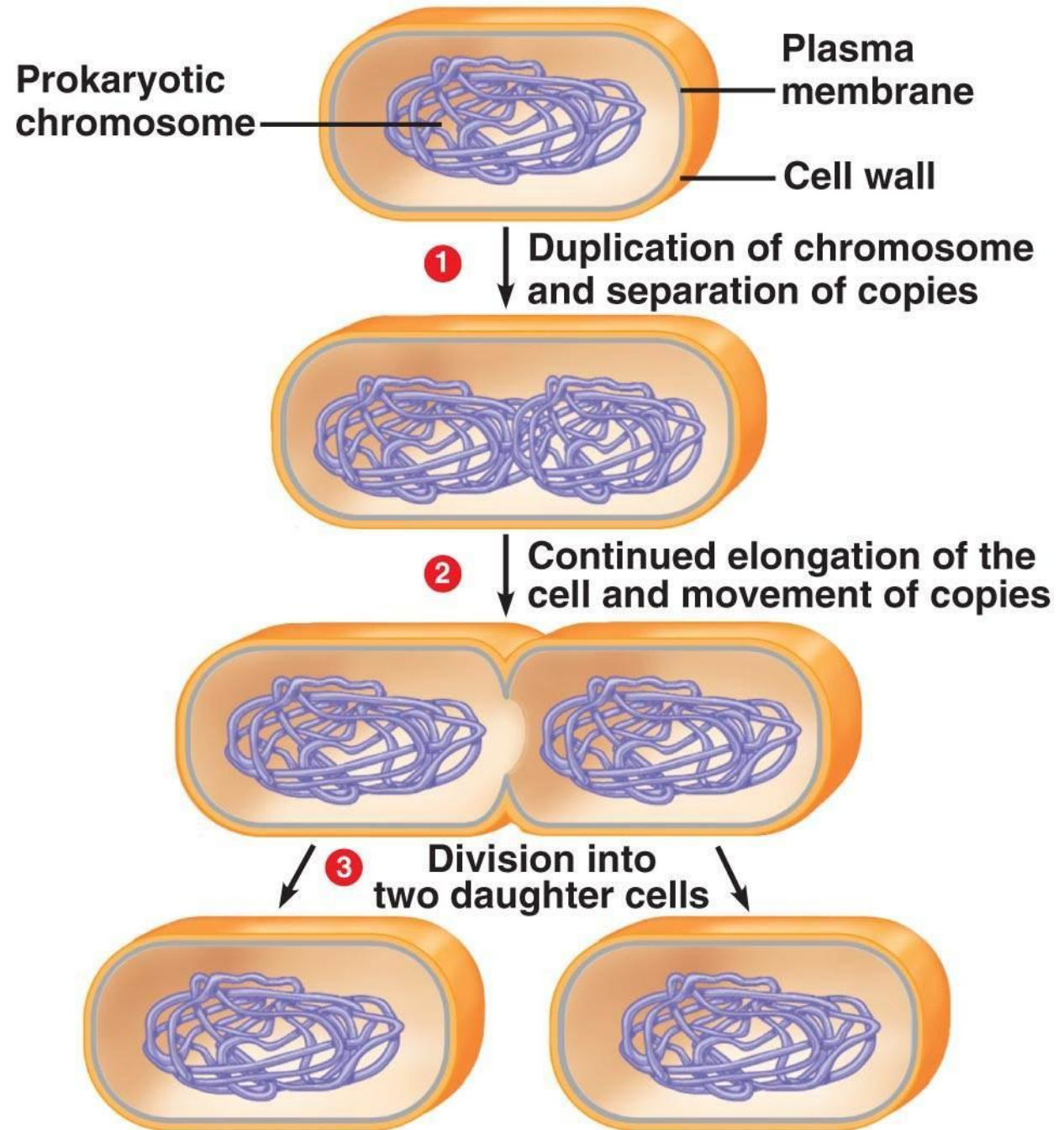
# VOCABULARY

- Reproduction: making more cells
- Growth: An organisms increases in size and changes over a lifetime
- Repair: When an organism is injured cells need to replace the ones that were damaged or removed.



# UNICELLULAR - BINARY FISSION

**This is how prokaryotic cells reproduce. A cell makes a genetic copy of itself and then splits in two, making two independent cells.**

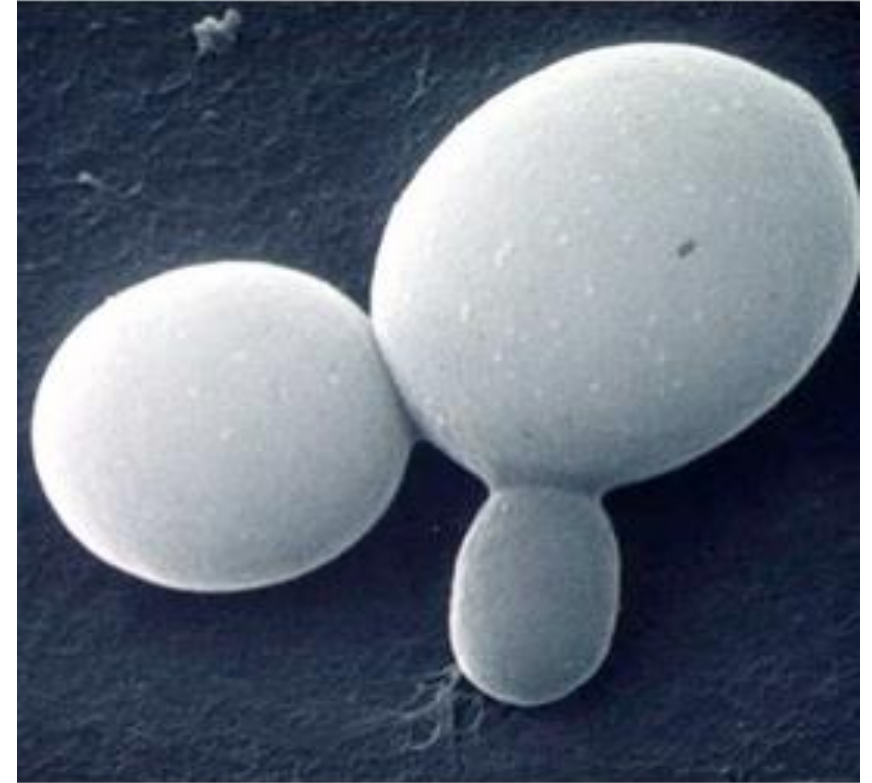




# BUDDING

- Budding: a process where an organism develops tiny copies of itself on its body.
  - Genetic material in the small copies, called buds, is the same as the parent cell.
  - The bud grows until it forms a complete or nearly complete genetic copy of the parent.
  - Budding happens with unicellular and multicellular organisms

Yeast Cell

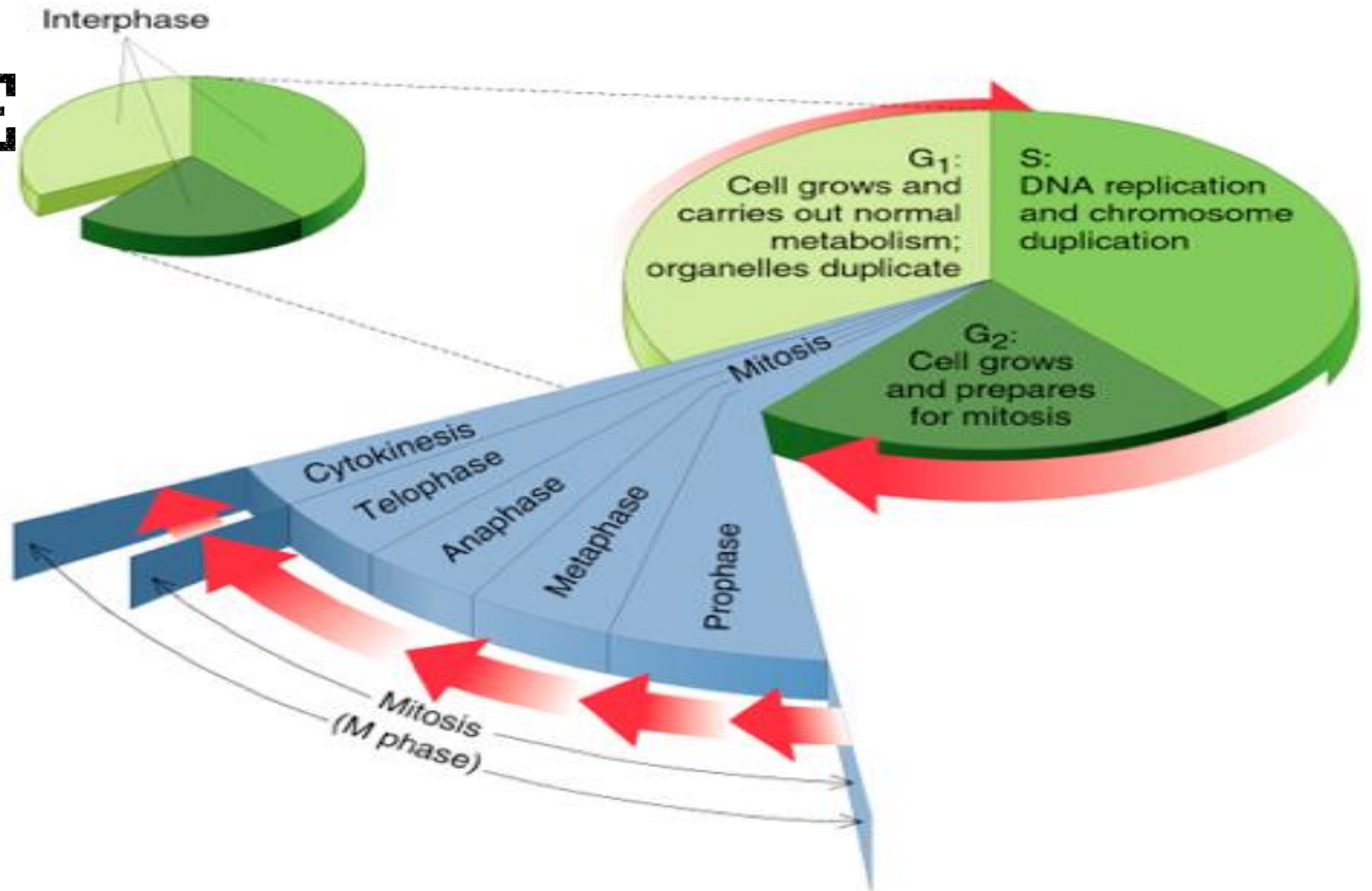


# EUKARYOTE: CELL CYCLE

- The Cell Cycle is the normal sequence of growth, maintenance (repair), and division in a cell.
  - The cell cycle includes three main parts:
    - interphase,
    - Mitosis
    - Cytokinesis
- Mr. Cramer's way of remembering all of the steps of the Cell cycle including the steps of mitosis:
  - I-PMAT-C
  - Say it like a proud puppy learning to be house trained.



# CELL CYCLE



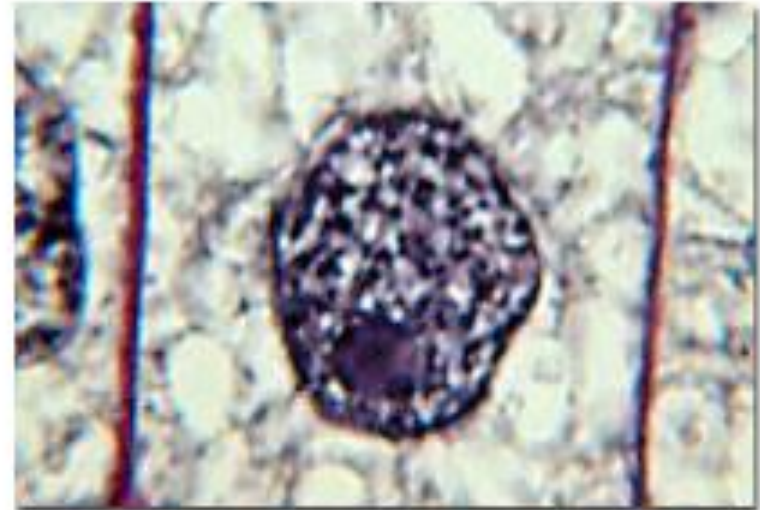


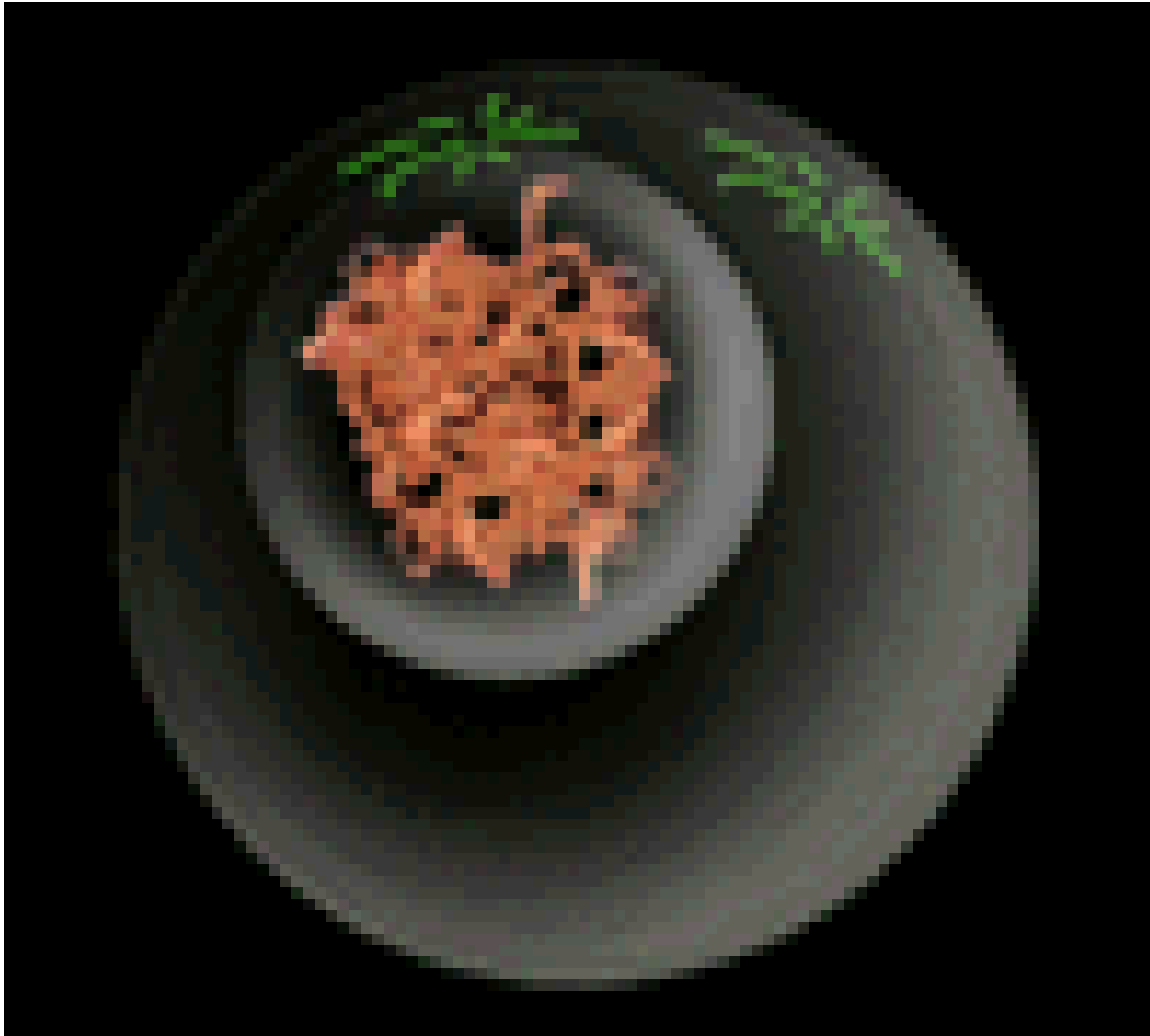
# INTERPHASE

- Growth and development of the cell
  - This is where the cell goes through normal processes
  - Also the Chromosomes (DNA and proteins) are duplicated and the cell prepares for mitosis (making new cells)

## INTERPHASE

The cell has grown and is ready to divide.





# MITOSIS

- The process in which the Nucleus is divided into two and then the cell makes a copy.
- **Mitosis goes from 1 cell to 2 identical cells**
- **Is used for growth and repair of the organism**
- The process of Mitosis can be remembered as: PMAT



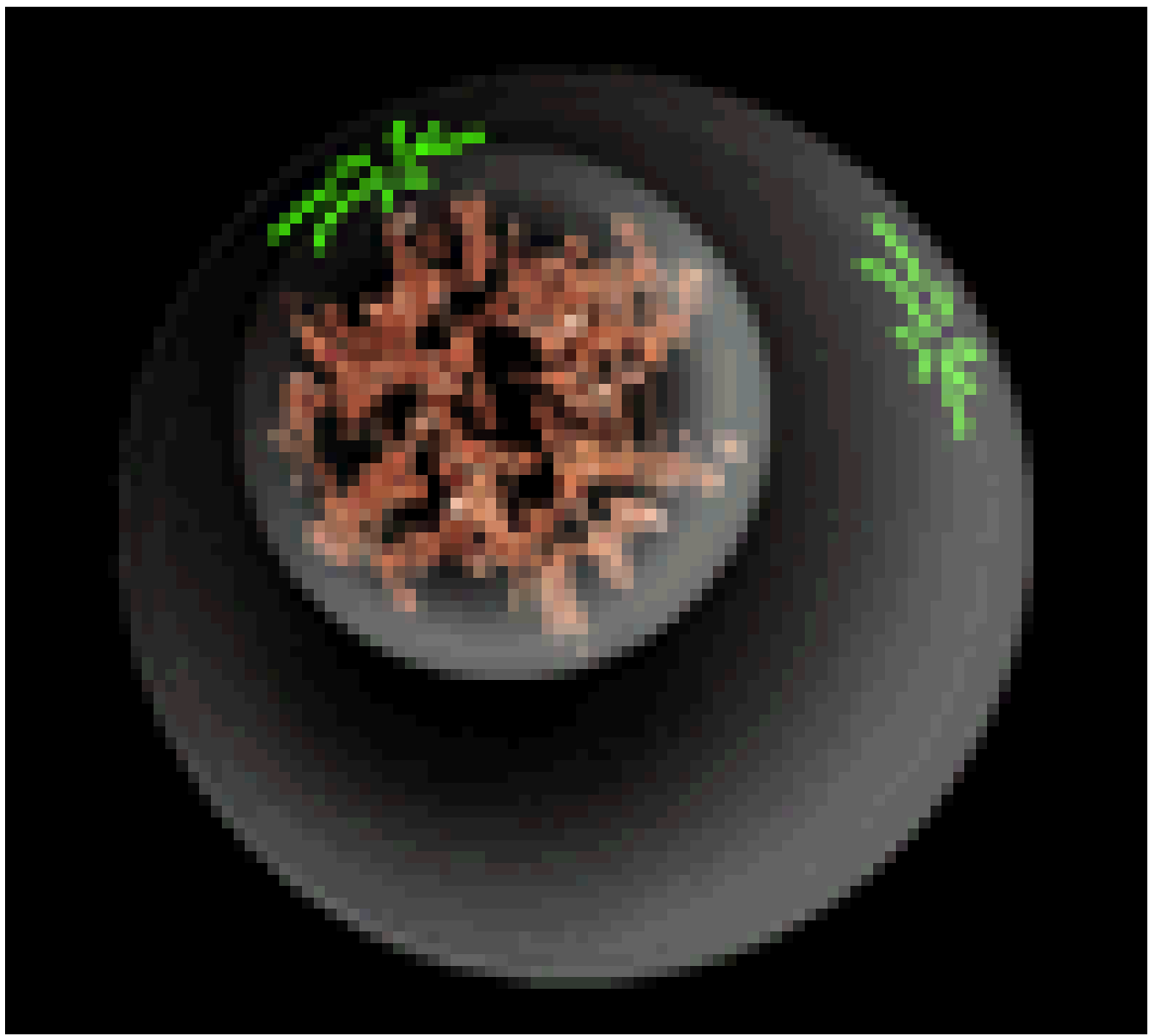
# P- PROPHASE

## MITOSIS

### PROPHASE

DNA condenses into chromosomes, each with two chromatids that are exact copies of each other.





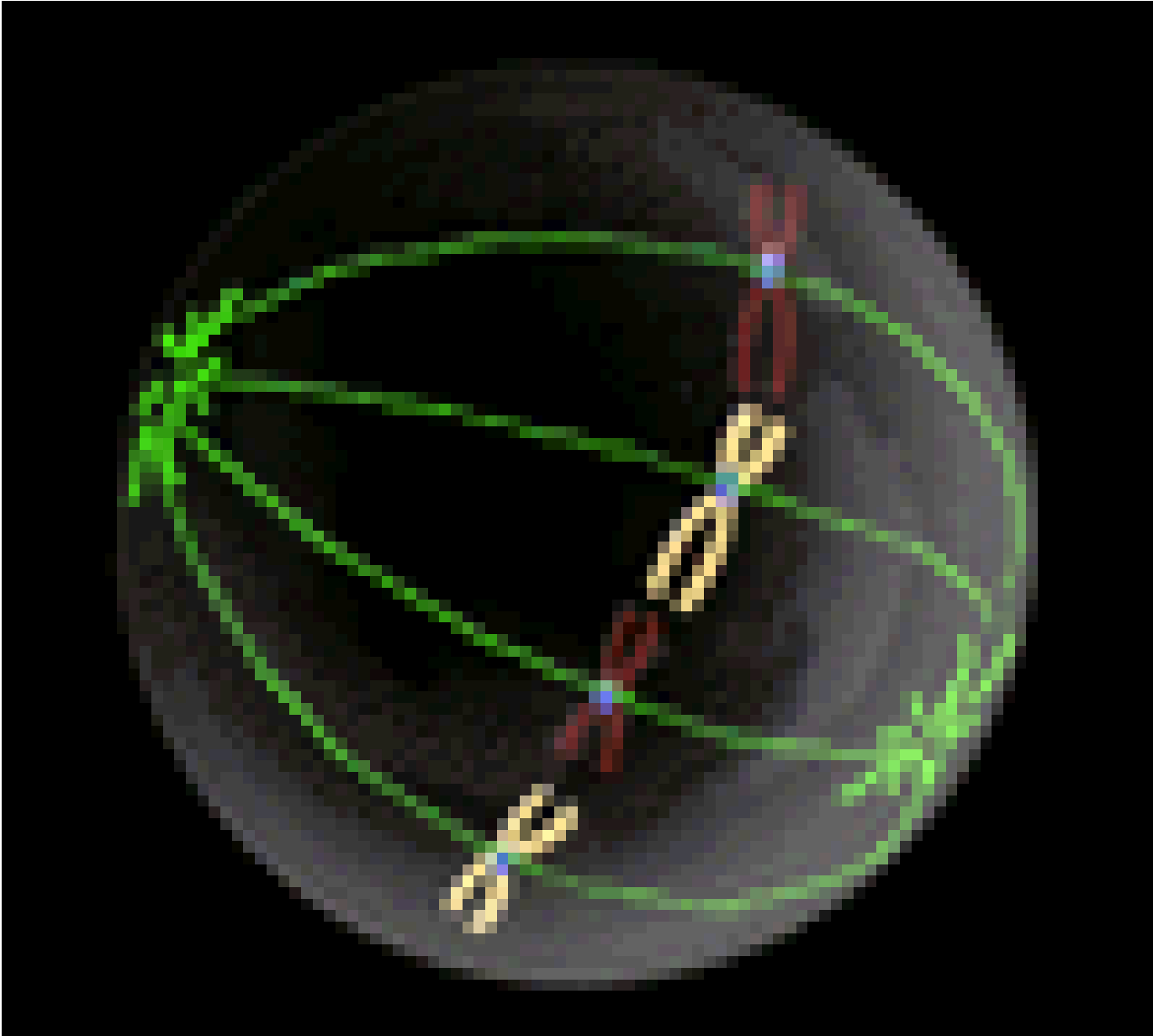


# METAPHASE

## METAPHASE

Chromosomes line up in the middle of the cell.



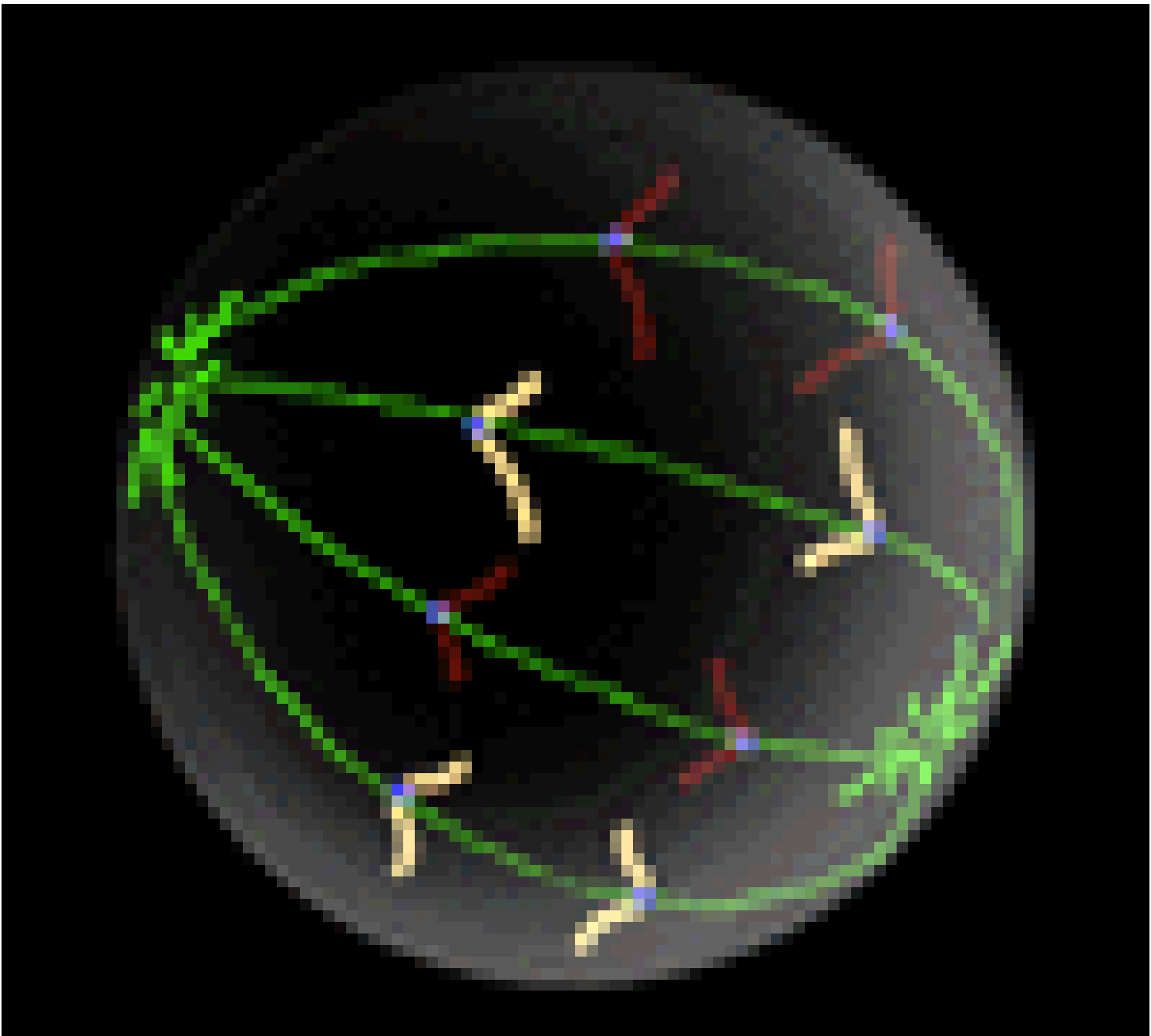


# ANAPHASE

## ANAPHASE

Chromosomes split into two chromatids and they are pulled to opposite sides.





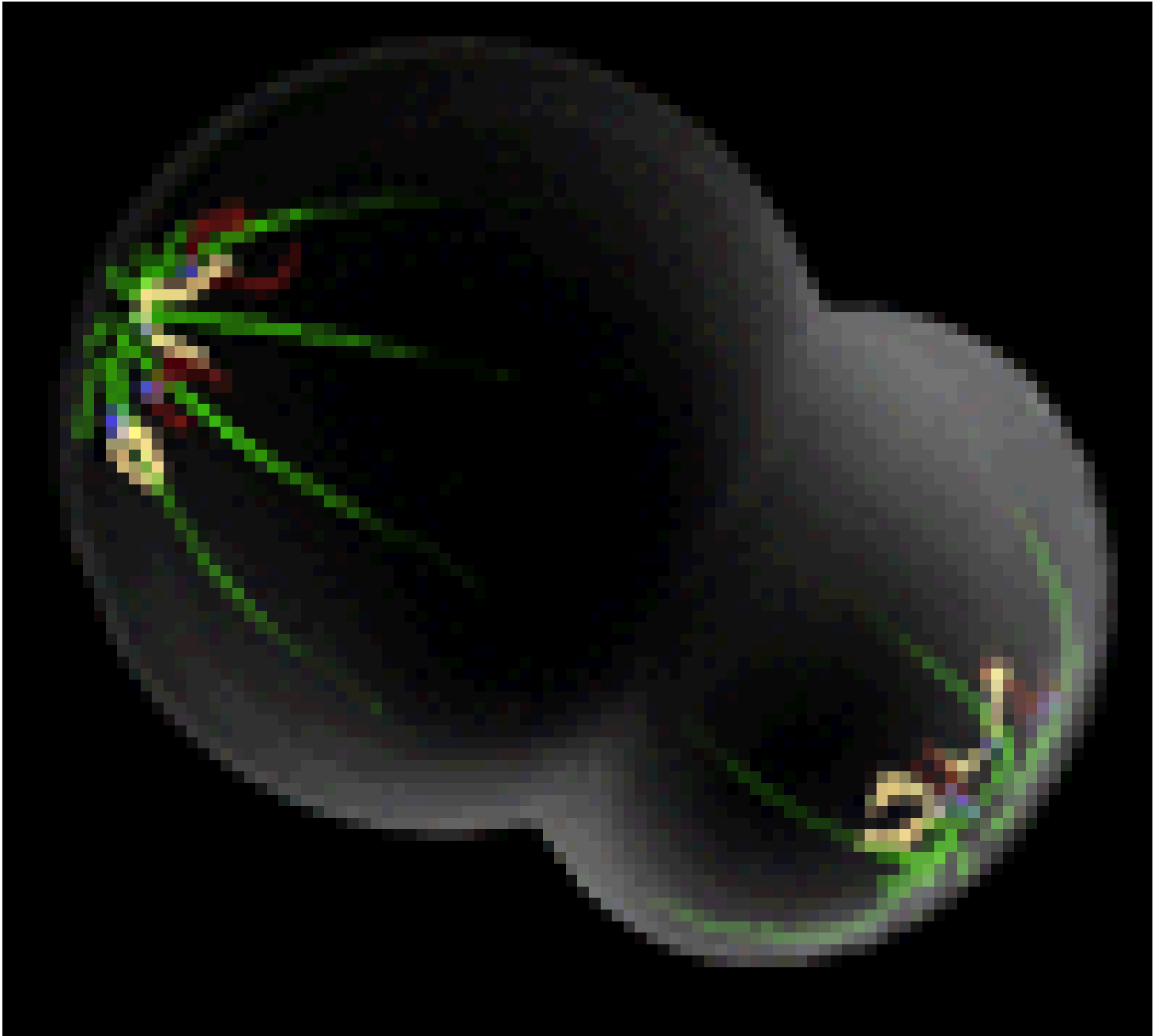
# TELOPHASE

## TELEPHASE

New nuclear membrane forms and the cell begins to divide.





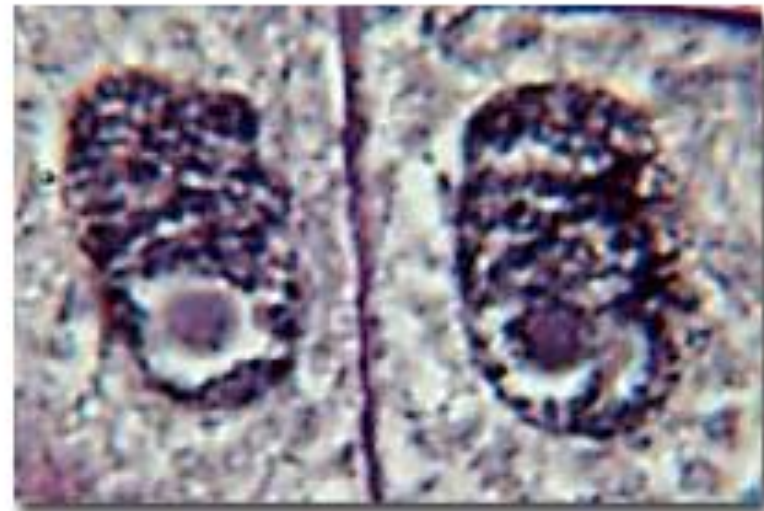


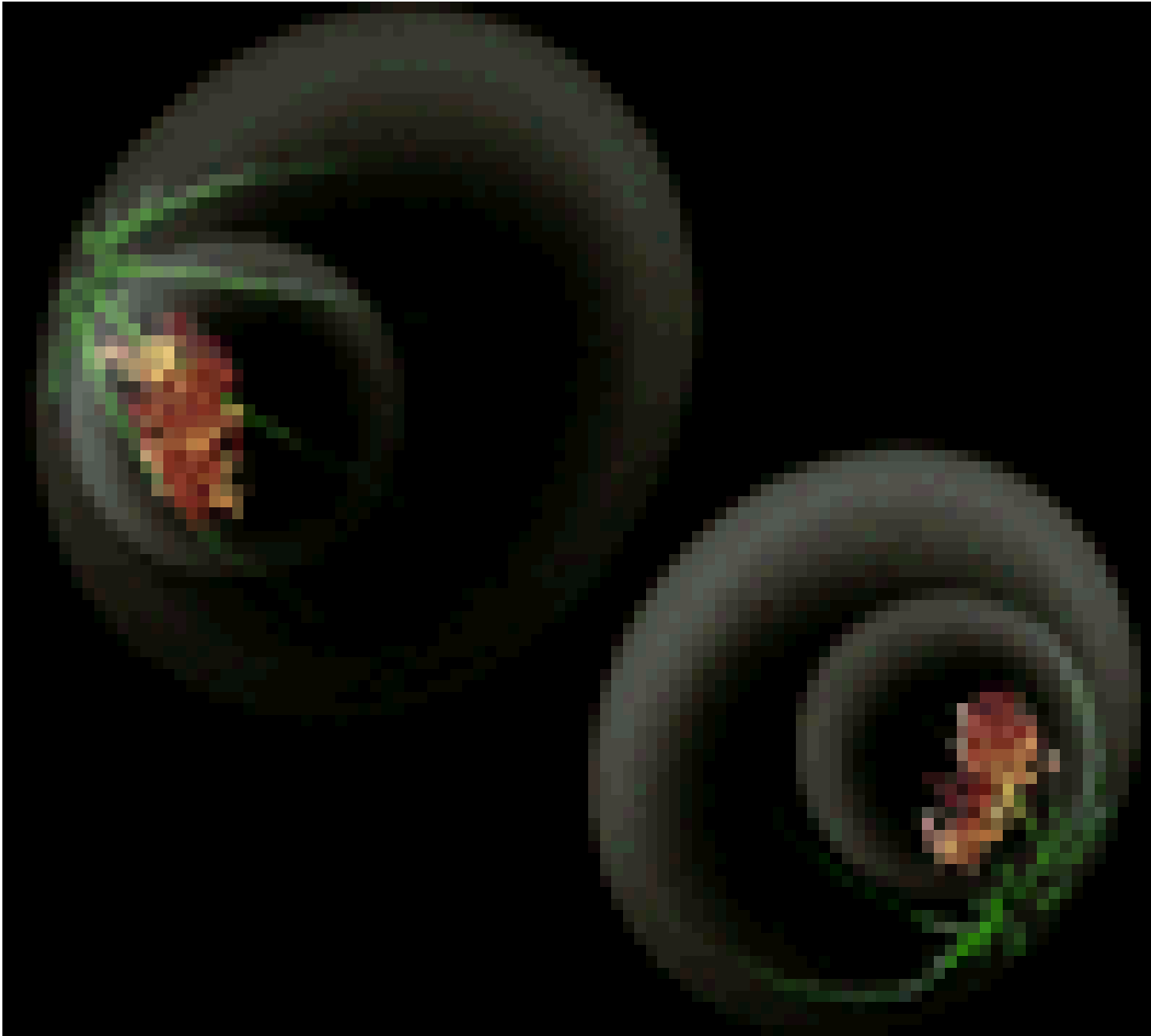
# AFTER MITOSIS: CYTOKINESIS

- The cytoplasm of the cell divides and the cell membrane splits down the center, forming 2 separate cells.
  - In plant cells a cell plate also forms down the center, enclosing both cells in a cell wall.

## CYTOKINESIS

Two new cells are formed and are ready to begin the cell cycle again.





- **Interphase** – Close hands together – everything is condensed together to start
- **Prophase** – Fingers up and out – chromosomes are condensing, nuclear envelope disappearing
- **Metaphase** – Invert fingers together – chromosomes meet in the middle and line up on the metaphase plate
- **Anaphase** – Begin to pull apart – the chromatids move toward separate poles
- **Telophase** – Pull hands to two separate balls – chromosomes are at the poles and two separate cells are beginning to be formed



# REAL CELLS

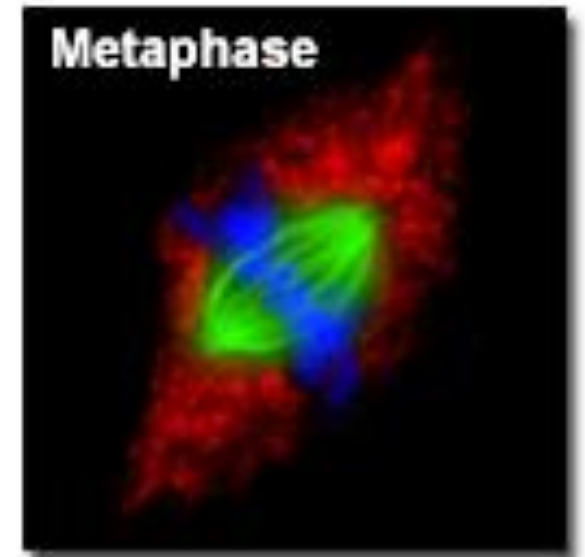
## Mitosis in Rat Kangaroo Epithelial Kidney Cells



(a)



(b)



(c)



(d)



(e)



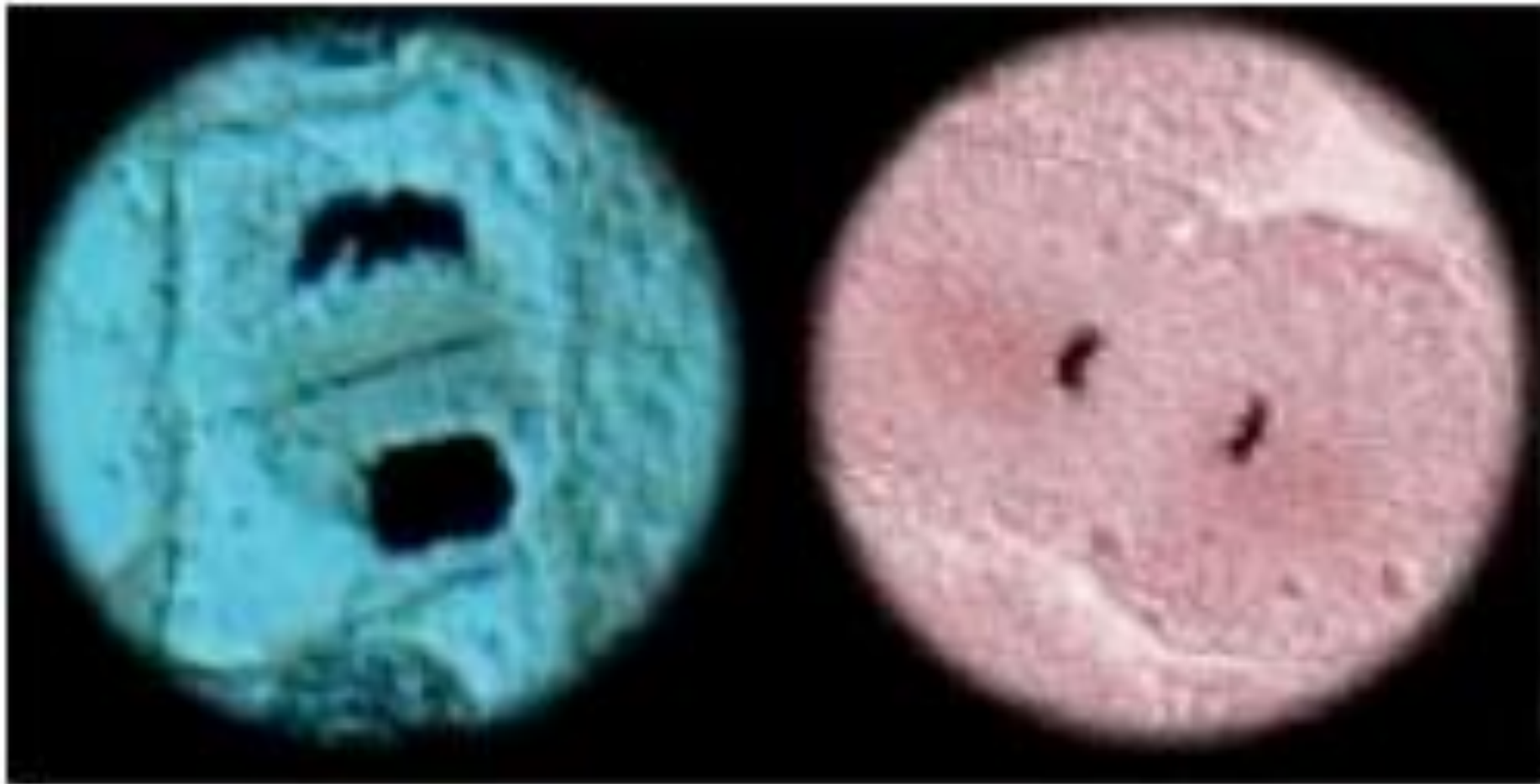
(f)

Figure 1





**WHICH IS A PLANT CELL AND WHY**



# REPRODUCTION

- Asexual reproduction: when an organism makes one or more genetic copies of itself as offspring.
  - Mitosis DOES NOT occur in asexual reproduction
- This is how prokaryotic cells reproduce. A cell makes a genetic copy of itself and then splits in two, making two independent cells.



# SEXUAL REPRODUCTION

- **Sexual Reproduction:** the type of reproduction most multicellular organisms use.
  - Involves 2 parents
  - Allows for genetic variation

