



Erasmus+

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Cell as a basic building unit

Microbiology

- ❑ The smallest functional and building unit of living organisms.

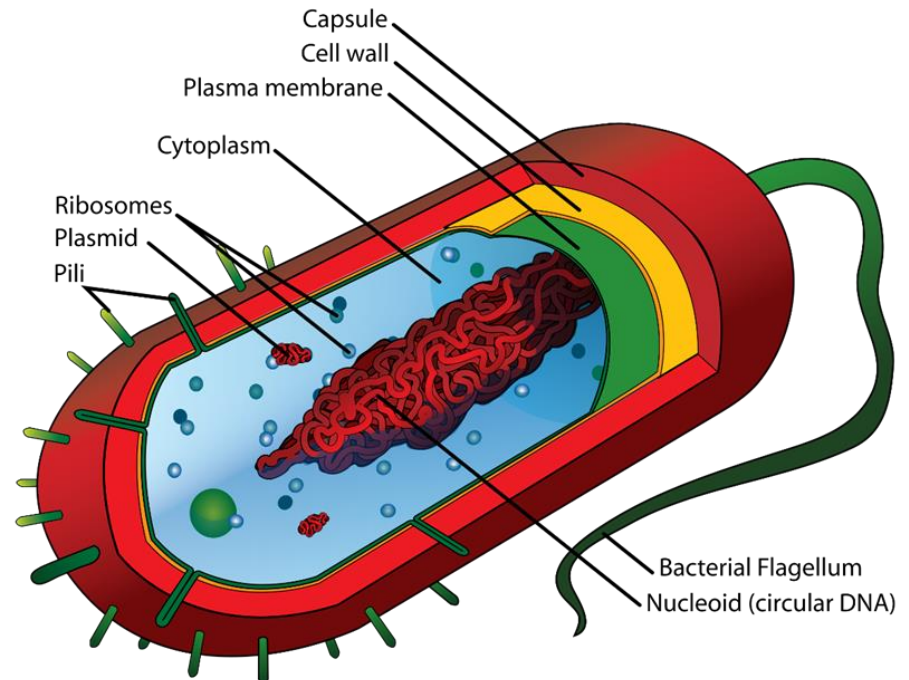
Cell characteristics:

- ❑ reproduction, constant metabolism and energy exchange with the environment, self-regulation, adaptation, storage/transformation of energy or substances, growth, differentiation, receiving and processing of stimuli, ability to move.

PROKARYOTIC CELL



- ❑ Unicellular organisms.
- ❑ Diverse in shape and size.
- ❑ Phylogenetically older and organizationally simpler.
- ❑ The nucleus is not bounded by the nuclear membrane.
- ❑ NO mitochondria or plastids.



EUKARYOTIC CELL

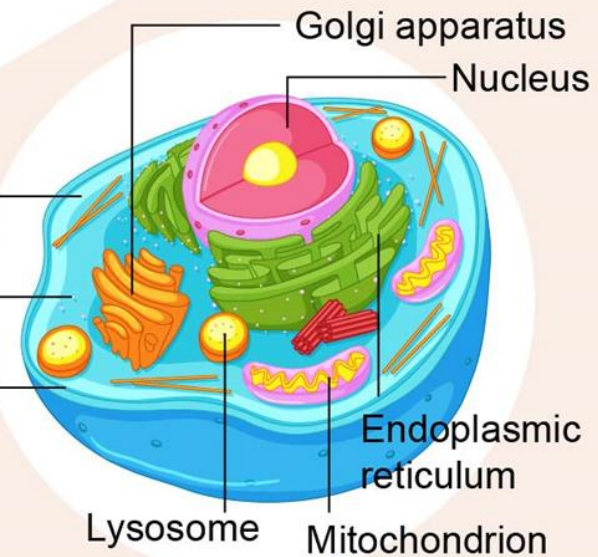
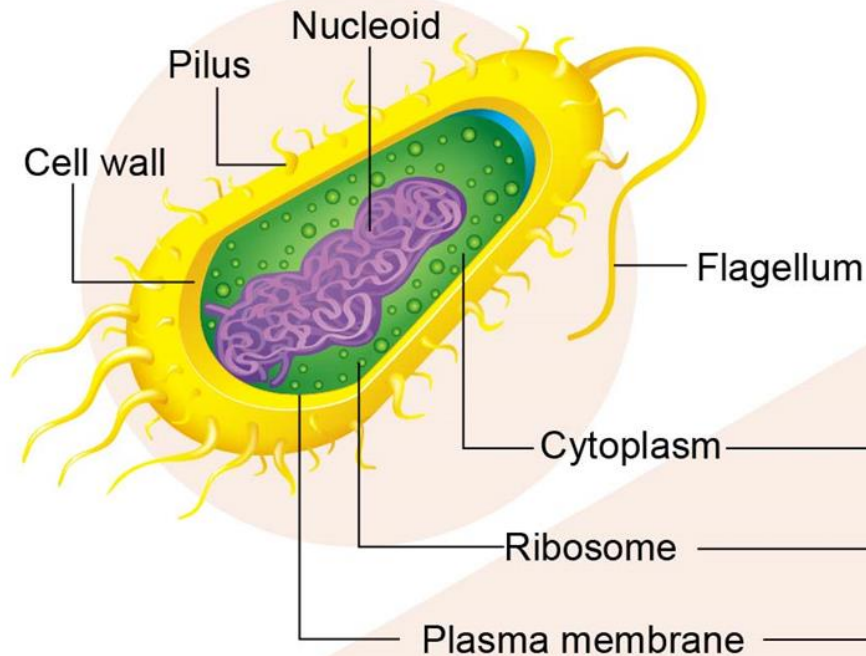


- ❑ More complex structure than a prokaryotic cell.
- ❑ Very diverse in shape and size.
- ❑ The inner space of the cell is divided into structural and functional units by biomembranes.
- ❑ Forms the body of protozoa, algae, fungi, plants and animals.

COMPARISON OF PROKARYOTIC AND EUKARYOTIC CELL



PROKARYOTE CELL



EUKARYOTE CELL

CELL STRUCTURE



- ❑ All cells have the basic principle of construction based on the presence of 4 components:
- ❑ a) cell surfaces - cell wall, cytoplasmic membrane
- ❑ b) cytoplasm
- ❑ c) cell organelles (structures)
- ❑ d) inanimate cell components

CELL STRUCTURE – CELL SURFACES



1. **Cell wall:** cells of plants, fungi and bacteria.

- ❑ Permeable to water and substances dissolved in it.
Affects the shape of cells, ensures their strength and protects against pathogens.

2. **Cytoplasmic membrane:** Present in all cells.

- ❑ It is semi-permeable and allows the transport of substances. Separates the cell from the environment.

CELL STRUCTURE



Cytoplasm:

- ❑ The internal environment of the cell, including all its structures and organelles.

Inanimate components:

- ❑ E.g. starch, fat droplets, protein crystals, calcium oxalate, silica .

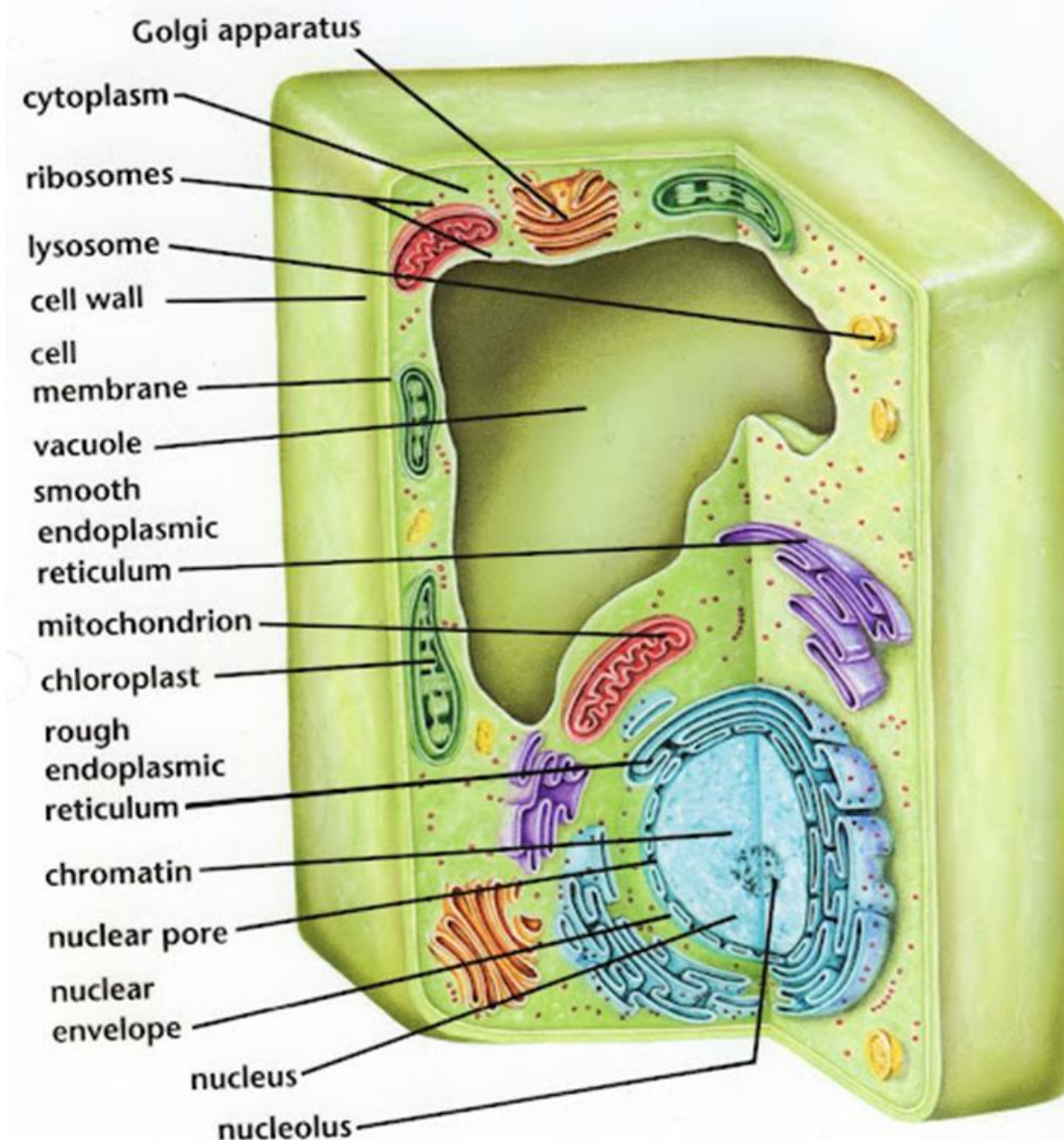
CELL STRUCTURE



Cell organelles:

- ❑ **Nucleus** - control and reproductive center of the cell. Contains most of the cell's genetic information.
- ❑ **Mitochondria** - energy and metabolic-respiratory centers of the cell.
- ❑ **Plastids** - occur only in plant cells. They contain pigments or storage substances. They also include chloroplasts - photosynthesis.
- ❑ **Vacuoles** - typical for plant cells. They contain enzymes and allow the storage of substances.
- ❑ **Ribosomes** - are important for protein synthesis.

CELL STRUCTURE





PLANT CELL

- ☐ Cell wall – YES
- ☐ Cytoplasmic membrane – YES
- ☐ Mitochondria – YES
- ☐ Vacuoles – YES
- ☐ Chloroplasts - YES



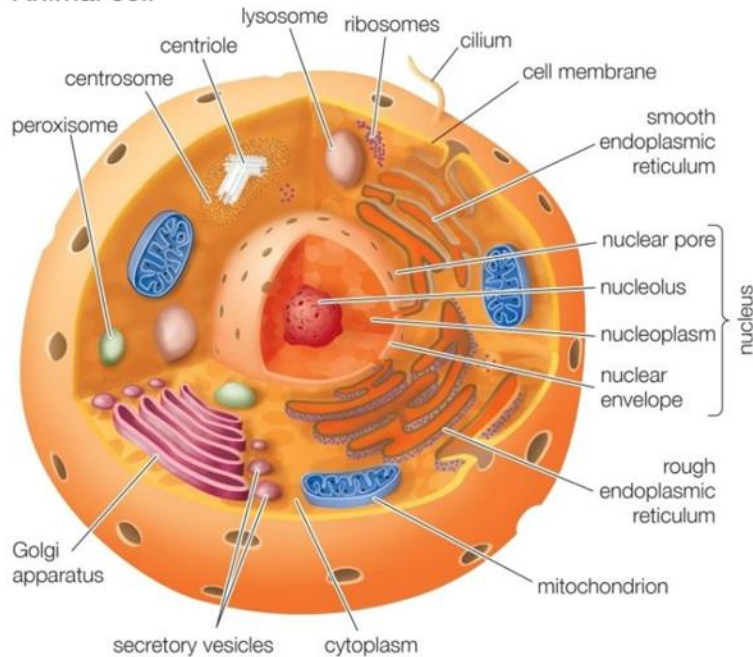
ANIMAL CELL

- ☐ Cell wall – NO
- ☐ Cytoplasmic membrane – YES
- ☐ Mitochondria – YES
- ☐ Vacuoles – NO (only in protozoa)
- ☐ Chloroplasts - NO

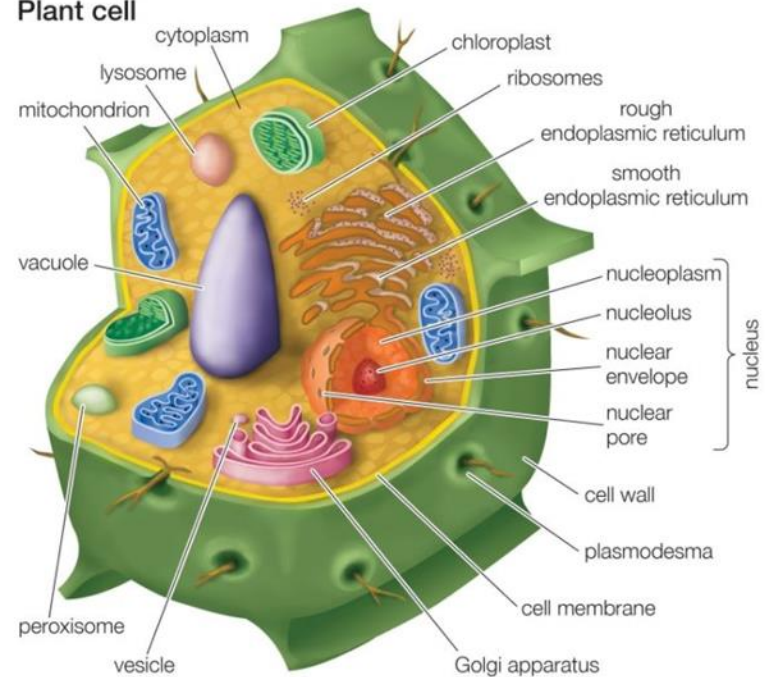
COMPARISON OF PLANT AND ANIMAL CELL



Animal cell



Plant cell



SINGLE-CELLED ORGANISMS



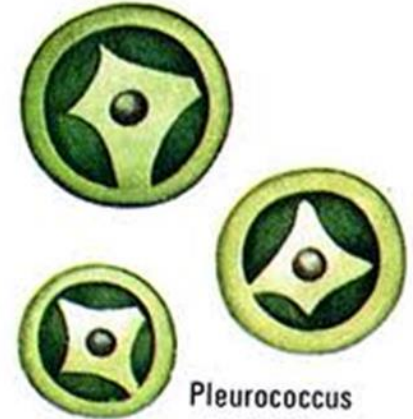
- ❑ Single-celled organism = unicellular organism.
They have a body made up of only one cell.
This cell performs all vital functions.
- ❑ Unicellular organisms include bacteria, some fungi, plants and animals.
- ❑ Single-celled plants = algae
- ❑ Single-celled animals = protozoa

UNICELLULAR PLANTS



- ❑ Presence of chlorophyll → photosynthesis → production of oxygen.

- ❑ **Pleurococcus**: lives individually or in colonies; has a spherical shape; forms green coatings on trees, houses or fences.

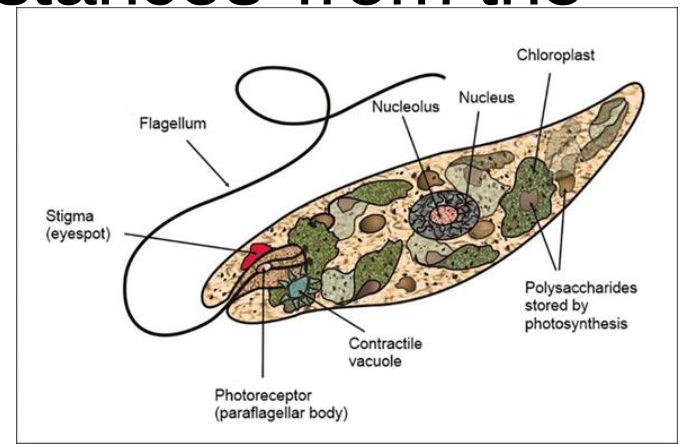


UNICELLULAR PLANTS



Euglenas:

- ❑ Mostly freshwater. They have a red spot (stigma) that is sensitive to light. Movement with a whip. They create organic substances during photosynthesis, and in the absence of light, they can also absorb organic substances from the surrounding environment.



UNICELLULAR ANIMALS

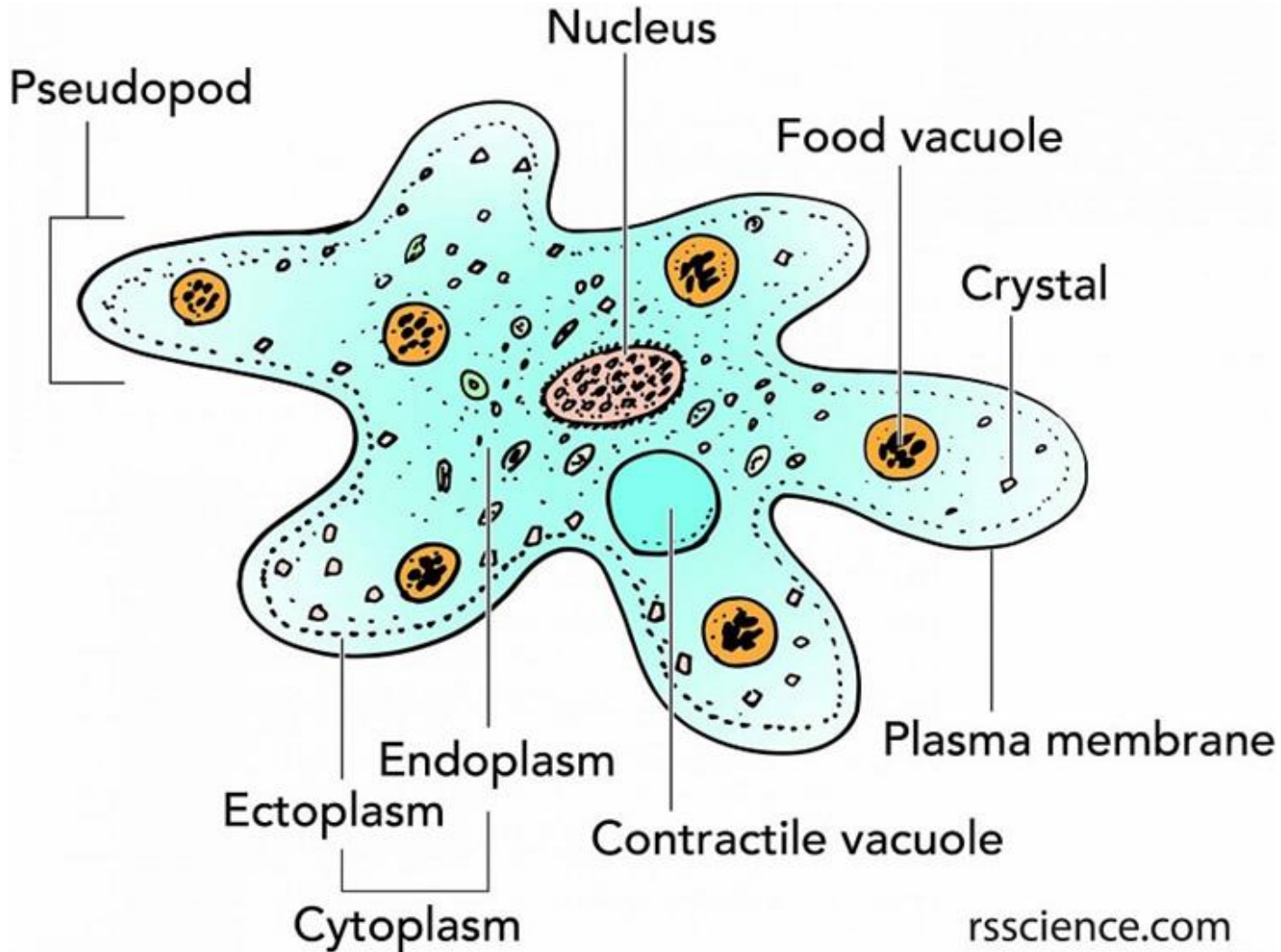


- ❑ Their cell may contain food and retractable vacuoles. They receive nutrients from the environment.

Amoeba proteus

- ❑ Lives in organically polluted waters. Moves with its pseudopodia. It feeds mainly on bacteria. Contains two cores. It reproduces asexually (by division) or sexually (by joining).

UNICELLULAR ANIMALS



MULTICELLULAR ORGANISMS



- ☐ The body of multicellular organisms is made up of a large number of cells.
- ☐ **Specialization** = a certain group of cells performs only a specific function.
- ☐ **Plant tissue** = a set of plant cells performing the same function.
- ☐ **Animal tissue** = a set of animal cells performing the same function .

PLANT TISSUES



According to function:

- ❑ **Meristematic** - allow the plant to grow.
- ❑ **Permanent** - they are specialized for performing a certain function.

Organization of plant body: cell → tissue → organ → organism



PLANT TISSUES



Permanent tissues:

- ❑ **Dermal** - cover the surface of the plant body and protect plants from environmental influences.
- ❑ **Vascular** - transport solutions in two directions (transpiration and assimilation current).
- ❑ **Ground** - fill the space between conductive and covering tissues. Including tissues for:
 - **Assimilation** – photosynthesis
 - **Storage** - storage of storage substances
 - **Excretion** - excretion of substances, e.g. essential oils.

ANIMAL TISSUE



Types of animal tissues:

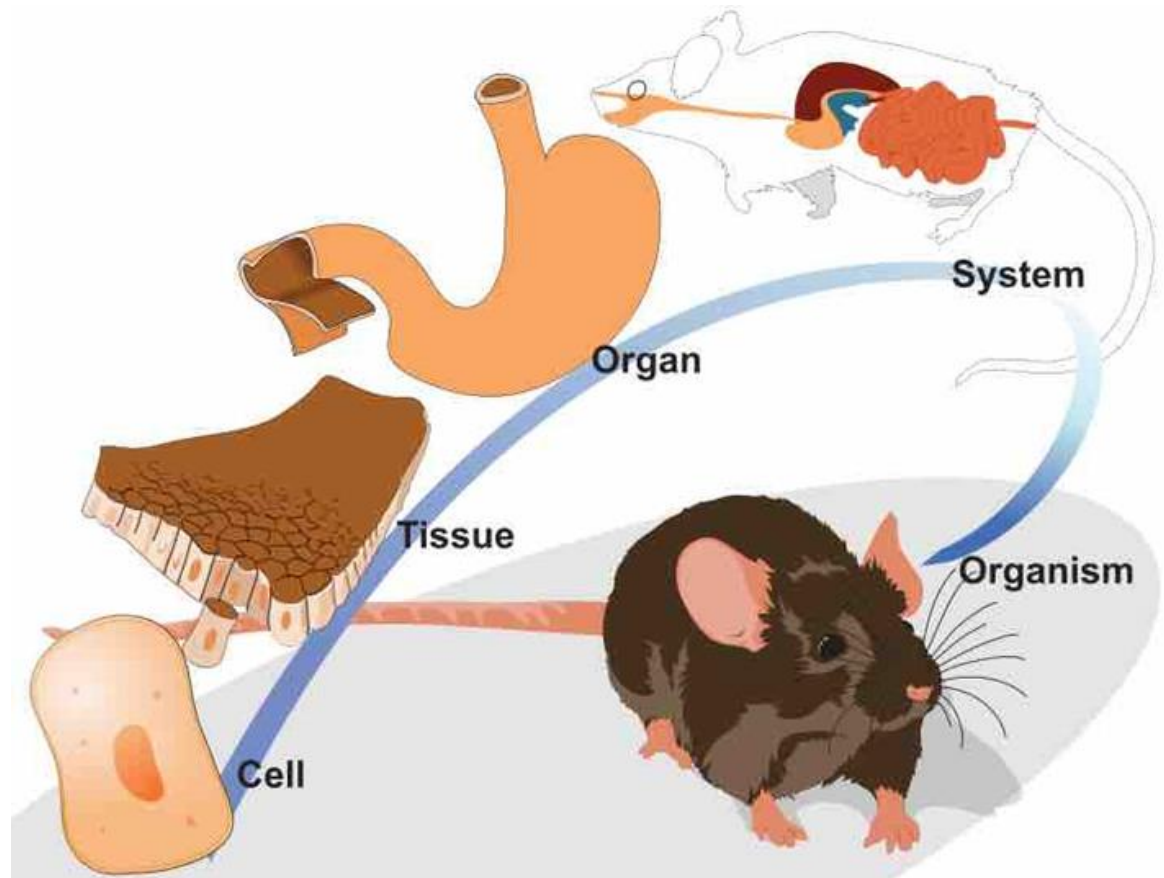
- ☐ **Epithelial** - located on the surface, but also inside the body. The epithelium can be:
 - **Covering** - covers the surface, e.g. skin.
 - **Sensory** - contains cells capable of responding to a stimulus, e.g. retina of the eye.
 - **Glandular** - its cells are capable of secreting, it is the basis of various glands.
- ☐ **Connective** - have a different function, e.g. mechanical support. These include ligaments, cartilage and bone.
- ☐ **Muscular** - ensures the movement of the body.
- ☐ **Nervous** - creates the nervous system.

ANIMAL TISSUES

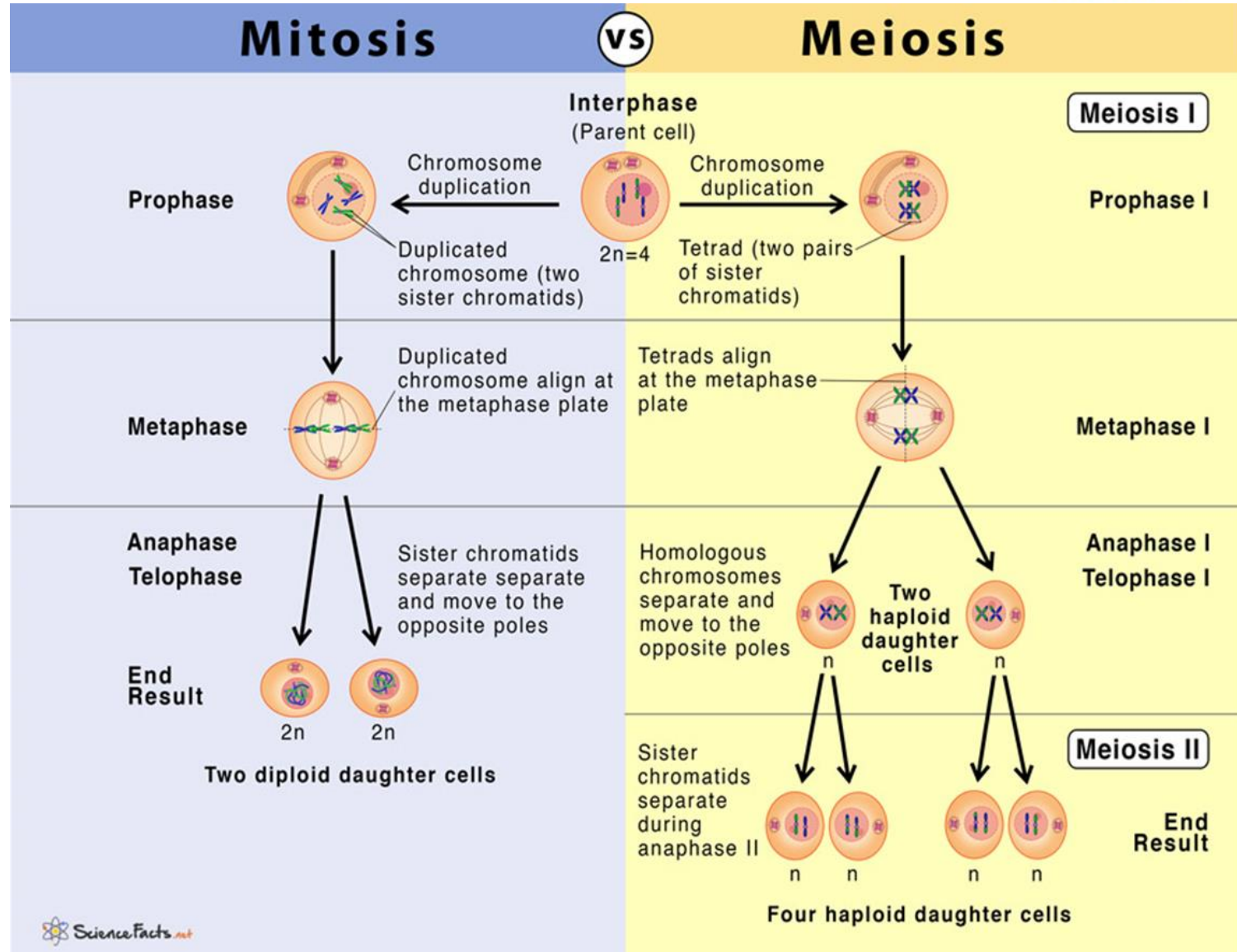


Organization of animal body:

cell → tissue → organ → system → organism



CELL DIVISION



PICTURES - USED SOURCES:



<https://rsscience.com/wp-content/uploads/2021/01/prokaryote-vs-eukaryote-l.jpg>

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