



Cells and Their Organelles

The **cell** is the basic unit of life. The following is a glossary of animal cell terms. All cells are surrounded by a **cell membrane**. The cell membrane is **semipermeable**, allowing some substances to pass into the cell and blocking others. It is composed of a double layer of **phospholipids** and **embedded proteins**. ***Color and label*** the cell membrane tan. Plant cells have an additional layer surrounding them called the cell wall. The cell wall is made of nonliving material called cellulose. ***Color and label*** the cell wall brown. The **centrosome** (also called the "microtubule organizing center") is a small body located near the nucleus. The centrosome is where **microtubules** are made. During **cell division (mitosis)**, the centrosome divides and the two parts move to opposite sides of the dividing cell. The **centriole** is the dense center of the centrosome. Only animal cells have centrosomes. ***Color and label*** the centrioles purple. Microtubules are shaped like soda straws and give the nucleus and cell its shape. ***Label*** the microtubules inside the nucleus.

1. At what level of organization does life begin?
2. What surrounds all cells?
3. What is meant by semipermeable?
4. What 2 things make up the cell membrane?
5. The cell membrane is also called the
 P _____ membrane.
6. Centrioles are found inside of what type of cell?

7. What additional layer is found around the outside of plant cells and bacteria?
8. Centrioles are found at the center of the C _____. How do they help the cell?

The **nucleus** in the center of a cell is a spherical body containing the **nucleolus** that makes **ribosomes**. The nucleus controls many of the functions of the cell (by controlling protein synthesis). It also contains **DNA** assembled into **chromosomes**. The nucleus is surrounded by the **nuclear membrane**. *Color and label* the nucleolus dark blue, the nuclear membrane yellow, and the nucleus light blue. Materials can move from the nucleus to the cytoplasm through nuclear pores in the membrane around the nucleus. *Label* the nuclear pores. **Cytoplasm** is the jellylike material outside the cell nucleus in which the organelles are located. *Color and label* the cytoplasm pink. All cells, even prokaryotes contain small bodies called **ribosomes**. *Label* the ribosomes. Proteins are made here by a process called **protein synthesis**.

9. Where is DNA found inside a cell?
10. What cell process is controlled by the nucleus?
11. DNA coils tightly during division and assembles into visible C _____.
12. Where are organelles located?
13. Where are proteins made in a cell?
14. Do all cells need ribosomes?
15. The process of making proteins is called _____.

Rough endoplasmic reticulum (rough ER) is a vast system of interconnected, membranous, infolded and convoluted sacks that are located in the cell's cytoplasm. The ER is continuous with the outer nuclear membrane. **Rough ER** is covered with ribosomes that give it a rough appearance. ***Color and label*** the rough ER violet. Rough ER transports materials through the cell and produces proteins in sacks called cistern which are sent to the **Golgi body**, or inserted into the cell membrane. The Golgi apparatus or Golgi complex is a flattened, layered, sac-like organelle that looks like a stack of pancakes. The Golgi body modifies & packages proteins and carbohydrates into membrane-bound **vesicles** for "export" from the cell. ***Color and label*** the Golgi export vesicles red. **Smooth ER** does NOT have ribosomes on its surface. It makes proteins and lipids that will be exported by the cell. It also controls the Calcium level in muscles and detoxifies poisons, alcohol, and drugs. ***Color and label*** the smooth ER light green.

16. How does rough ER differ from smooth ER?

17. Rough ER is connected to the _____ membrane and to _____ER.

18. Proteins made by rough ER travel to the Golgi in sacks called _____. Golgi _____ and _____ proteins for export out of the cell.

19. Give 3 jobs for smooth ER.

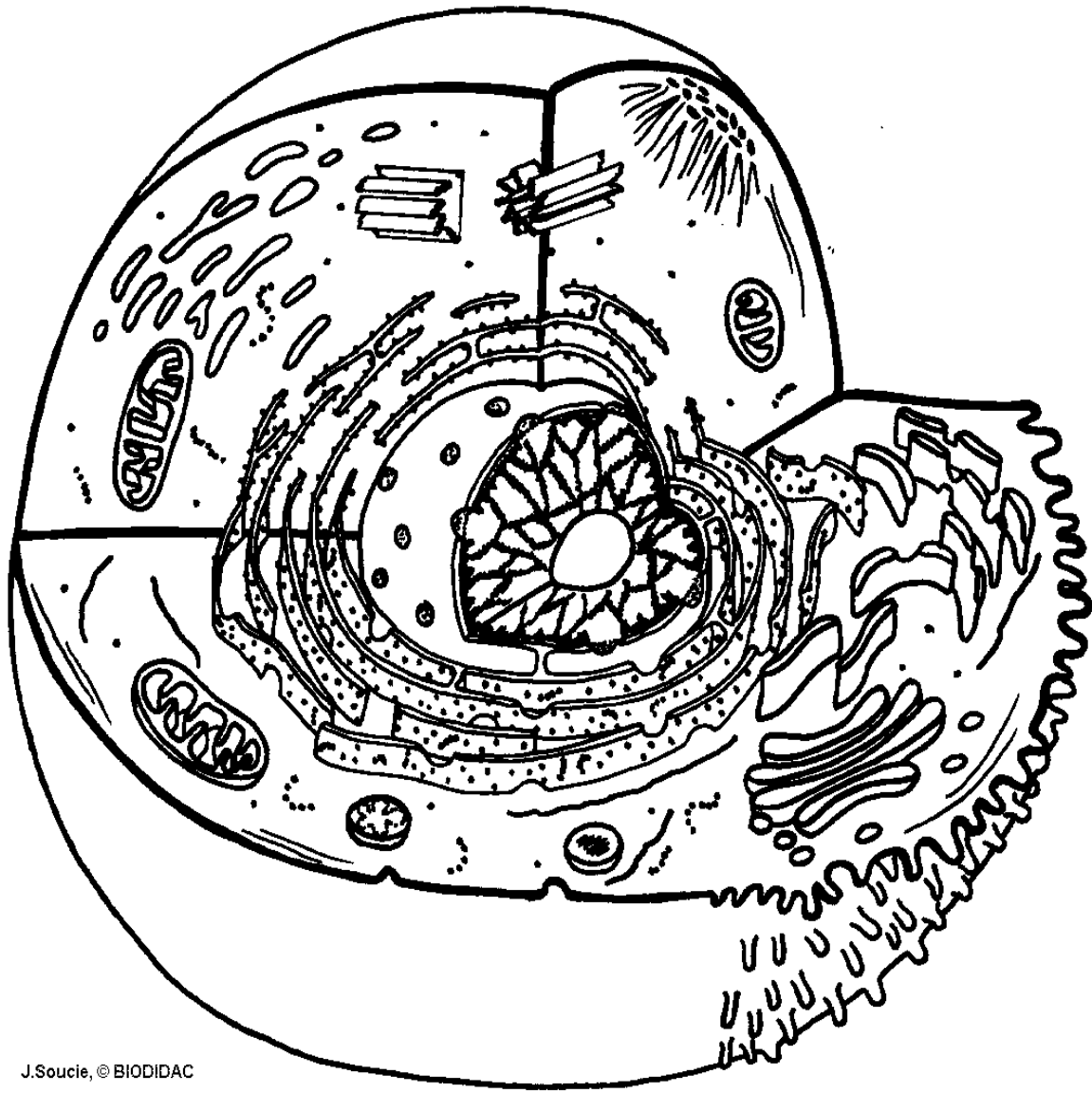
- a.
- b.
- c.

Chloroplasts are elongated or disc-shaped organelles containing **chlorophyll** that trap sunlight for energy. **Photosynthesis** (in which energy from sunlight is converted into chemical energy - food) takes place in the chloroplasts. Only plant cells, not animal cells, can make

their own food. ***Color and label*** the chloroplasts dark green. Cells also contain fluid-filled sacs called **vacuoles**. The vacuole fills with food being digested and waste material that is on its way out of the cell. In plant cells, a large **central vacuole** takes up most of the space in the cell. ***Color and label*** the vacuoles purple. **Mitochondria** are spherical to rod-shaped organelles with a double membrane. The inner membrane is infolded many times, forming a series of projections called **cristae**. The mitochondrion converts the energy stored in glucose into ATP (adenosine triphosphate) for the cell. ***Color and label*** the mitochondria orange. Both plant and animal cells have double membranes and their own DNA. Cells also contain spherical organelles called **lysosomes** that contain **digestive enzymes**. Nutrients are digested by the cell here, as well as, old cell organelles that are going to be recycled. ***Color and label*** the lysosomes tan.

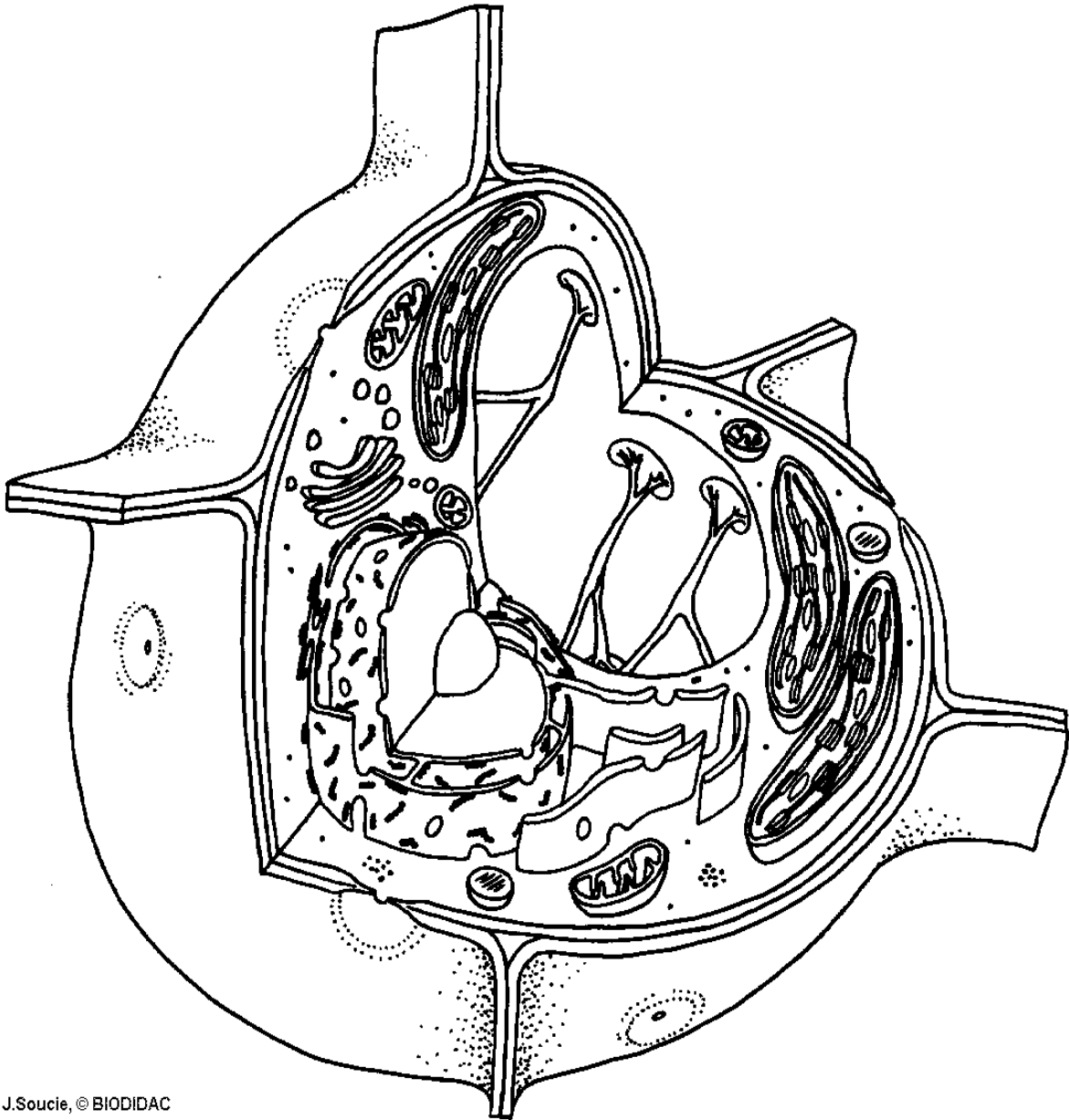
20. What process takes place inside chloroplasts?
21. What is the energy for this process?
22. What pigment traps the energy?
23. Chloroplasts are found in what type of cell(s)?
24. Both chloroplasts and mitochondria are like in that they both have _____ membranes and their own _____.
25. Food, water, and wastes are stored inside _____.
26. Digestion takes place inside _____ containing _____.
27. The largest organelle in plants is the _____.
28. What organelle breaks down and recycles worn out cells?

Figure 1 - Animal Cell



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Figure 2 - Plant Cell



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Complete the following table:

Organelle	Plant/Animal/Both	Function
Cell membrane		
Cell wall		
Cytoplasm		
Vacuole		
Ribosome		
Golgi		
Rough ER		
Smooth ER		
Central Vacuole		
Chloroplast		
Mitochondria		
Nucleus		
Nucleolus		
Nuclear membrane		
Centrosome		
Lysosomes		
Microtubules		
Nuclear pores		