MR. WOOD

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?
   Cells are the basic building block of life.
2. What surrounds all cells?
   CELL MEMBRANE
3. What is meant by semipermeable?
   ALLOWS SOME SUBSTANCES TO PASS INTO THE CELL AND BLOCKING OTHERS.
4. What 2 things make up the cell membrane?
   PHOSPHOLIPIDS AND EMBEDDED PROTEINS
5. The cell membrane is also called the

   P L A S M A membrane.

6. Centrioles are found inside of what type of cell?
   ANIMAL CELLS

7. What additional layer is found around the outside of plant cells and bacteria? CELL WALL
8. Centrioles are found at the center of the CENTROSOME. How do they help the cell? - MAKES MICROTUBULES AND GIVES/PROVIDES SUPPORT TO CELL DURING MITOSIS (CELL DIVISION)

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?
   INSIDE THE NUCLEUS
10. What cell process is controlled by the nucleus?
    CELL FUNCTION AND PROTEIN SYNTHESIS)
11. DNA coils tightly during division and assembles into visible CHROMOSOMES.
12. Where are organelles located?
    IN THE CYTOPLASM, OUTSIDE THE NUCLEUS
13. Where are proteins made in a cell?
    RIBOSOMES
14. Do all cells need ribosomes?
    YES
15. The process of making proteins is called PROTEIN SYNTHESIS.

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?
ROUGH ER - COVERED WITH RIBOSOMES - PRODUCE AND TRANSPORT PROTEINS | SMOOTH ER - NOT COVERED WITH RIBOSOMES. PRODUCE PROTEINS AND LIPIDS FOR EXPORT.
17. Rough ER is connected to the NUCLEAR membrane and to SMOOTH ER.
18. Proteins made by rough ER travel to the Golgi in sacks called CISTERN. Golgi MODIFIES and PACKAGES proteins for export out of the cell.
19. Give 3 jobs for smooth ER.
    a. MAKES PROTEINS FOR EXPORT AS WELL AS LIPIDS
    b. CONTROLS CALCIUM LEVEL IN MUSCLES
    c. DETOXIFIES POISONS, ALCOHOL, AND DRUGS

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?
PHOTOSYNTHESIS (converting the Sun's energy in to Food for the cell.)
21. What is the energy for this process?
SUN
22. What pigment traps the energy?
CHLOROPHYLL
23. Chloroplasts are found in what type of cell(s)?
PLANT CELLS
24. Both chloroplasts and mitochondria are like in that they both have DOUBLE membranes and their own DNA.
25. Food, water, and wastes are stored inside VACUOLES.
26. Digestion takes place inside LYSOSOMES containing DIGESTIVE ENZYMES.
27. The largest organelle in plants is the CENTRAL VACUOLE.
28. What organelle breaks down and recycles worn out cells?
LYSOSOME

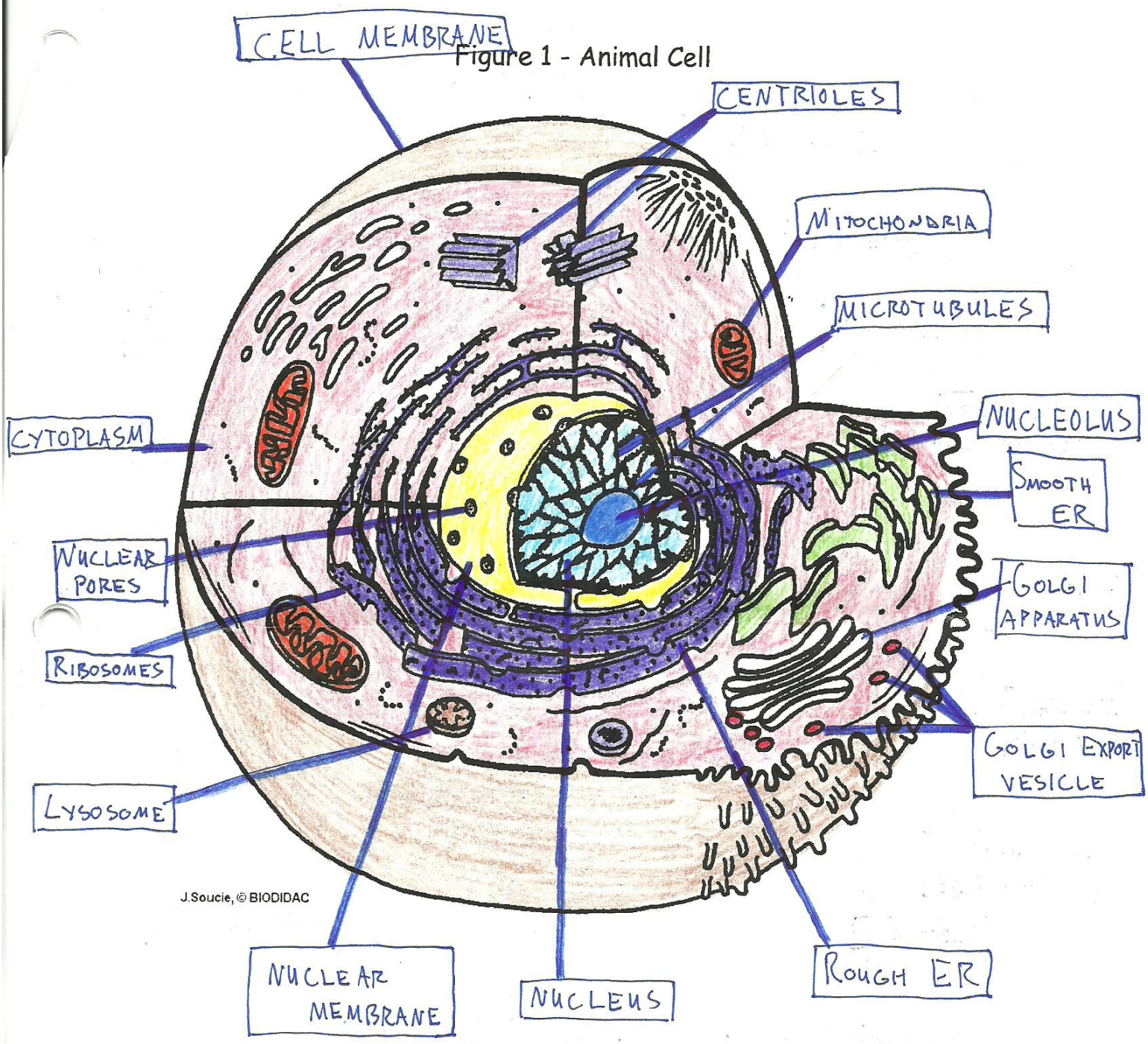
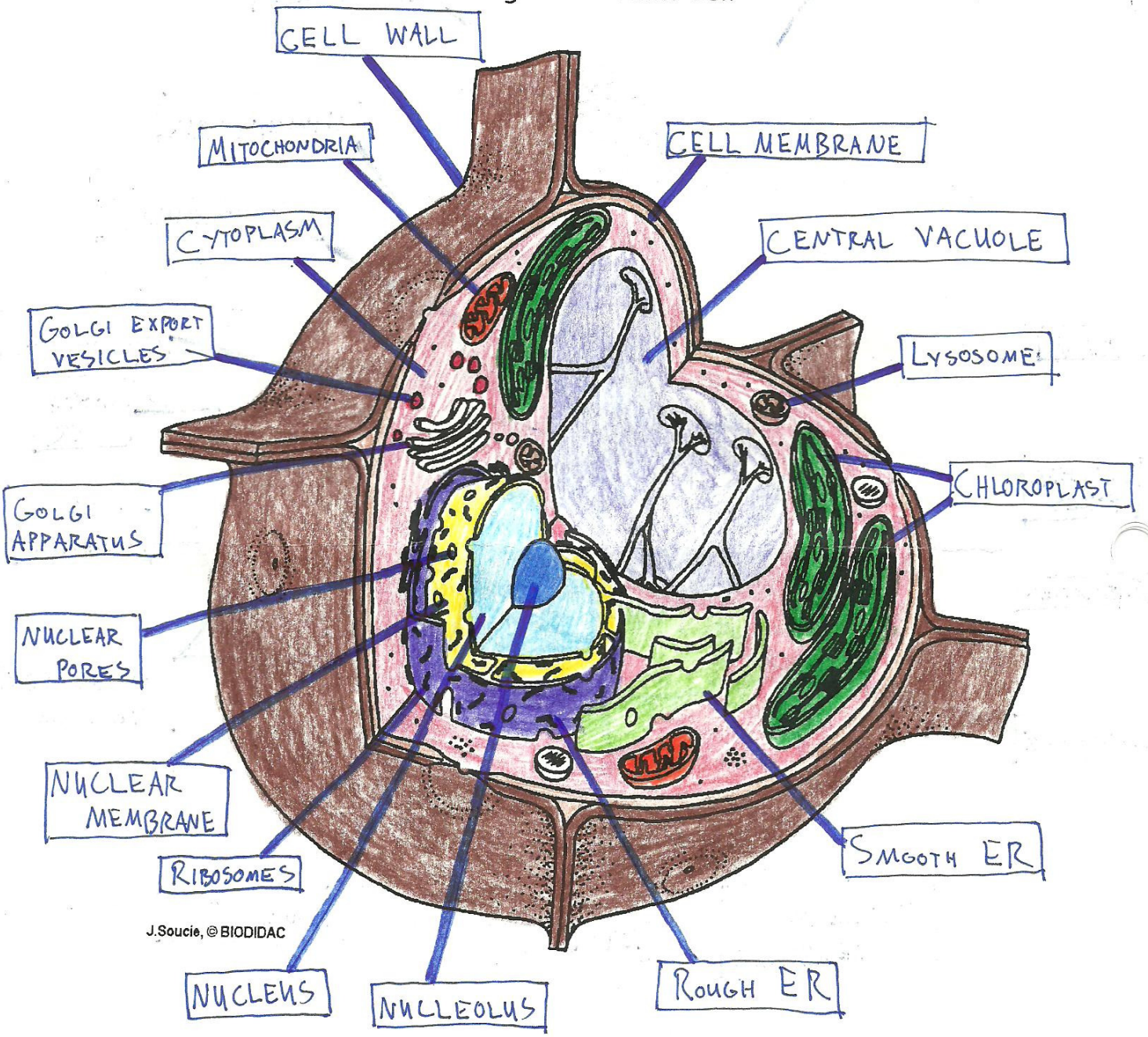


Figure 1 - Animal Cell

Figure 2 - Plant Cell



Complete the following table:

Organelle	Plant/Animal/Both	Function
Cell membrane	BOTH	a semipermeable layer that allows some substances in to the cell and blocks others from entering
Cell wall	PLANT	provides rigid support and structure to the cell
Cytoplasm	BOTH	gelatin-like filling that is mostly water helps suspend the organelles
Vacuole	BOTH	store water and waste and food being digested
Ribosome	BOTH	make proteins
Golgi	BOTH	modifies and packages proteins
Rough ER	BOTH	transports materials through the cell and produces proteins
Smooth ER	BOTH	makes proteins and lipids that will be exported by the cell
Central Vacuole	PLANT	stores water, digesting food, waste
Chloroplast	PLANT	converts Sun's energy to Food (photosynthesis)
Mitochondria	BOTH	takes Food and converts to energy for cell.
Nucleus	BOTH	controlls cellular function. "brain" of cell
Nucleolus	BOTH	makes ribosomes
Nuclear membrane	BOTH	processes substance to allow in or out of nucleus
Centrosome	ANIMAL	produces microtubules which provide support during cell division "mitosis"
Lysosomes	BOTH	digest food and old cell parts
Microtubules	ANIMAL	provide support to cell during cell division "mitosis"
Nuclear pores	BOTH	pathway for substances to move from nucleus to cytoplasm