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CASE

Activity 4.1.3 Bound Together

Purpose

Plant cell organelles, microscopic in size, must all function together in order for the cell to function. In turn, the entire plant benefits from every organelle carrying out a specific function.

In your school, you have many different people working to provide food, secretarial, record keeping, custodial, nursing, transportation, and other support-type services. Your teachers are further divided into departments such as language, fine arts, history, physical education, mathematics, career and technical, and science. Imagine what would happen if just one of those groups of staff members did not do their job every day. The entire student body would be affected.

Just as the people who work in your school all have very different responsibilities; cell organelles have very different jobs. If an organelle were missing, would the effect be noticeable? Which organelle affects the most other organelles?

Materials

Per pair of students:

- *Plant and Soil Science: Fundamentals and Applications* text
- Computer with Internet access and graphic organizer software

Per student:

- Pencil
- *Agriscience Notebook*

Procedure

Using the information from *Project 4.1.1 Cell Analogy Collage,* you and your partner will diagram the relationships between organelles of a plant cell.

Part One – Identify and Label Relationships

1. Use information from the resources listed below to help you identify which organelles work with or provide for other organelles:
    - Cells Alive Interactive Plant Cell **http://www.cellsalive.com/cells/cell_model.htm** (click on individual organelles for information about structure and function)
    - Pages 70-73 of *Plant and Soil Science: Fundamentals and Applications* (Parker, 2010)
    - Recorded information from *Project 4.1.1 Cell Analogy Collage*
2. Fill in Table 1 on the student worksheet with your findings. A sample entry discussing the relationship between leucoplasts and the endoplasmic reticulum is included in the first row. Some organelles may be repeated several times with different organelle relationships. Additional space may be required for relationships not suggested by the table. Relationships will vary, but focus on the material or message moving between the two organelles to help you define the relationships in the space provided.

Part Two – Show the Relationships

1. Your teacher will review how to make text boxes, connectors, and labels on a graphic organizer program.

1. Choose three relationships from Table 1 to represent in your diagram. You will focus on relationships that are related. Examples include relationships that have to do with energy production and metabolism, protein synthesis, waste production and management, or communication pathways. A sample relationship has been illustrated in Figure 1.
2. In the graphic organizer program, create a title box that contains the focus of relationships (Energy, Protein, etc) and the names of both partners.
3. Next, add text boxes or import graphics to represent each organelle involved in the relationships chosen in Step 2.
4. Clearly label each organelle.
5. Use arrows or other connectors to show the relationships between organelles. Arrows may signify the direction of the flow of energy, materials, or messages.
6. Label the arrows or connectors with specific information regarding the relationship.

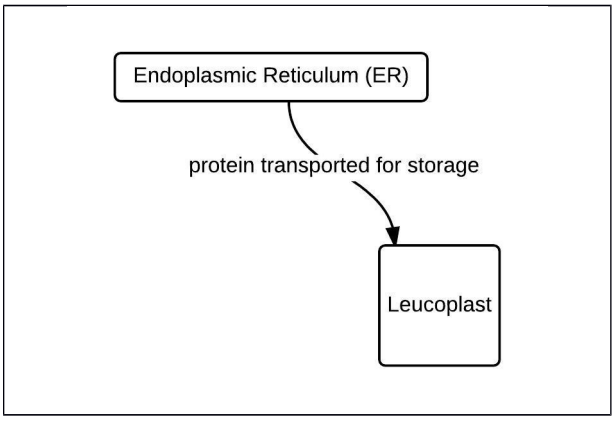

Figure 1. Sample Relationship Diagram

7. When directed by your teacher, share your organizer with your classmates and discuss how organelles work together to perform cellular processes.

Conclusion

1. Where does the flow of energy seem to begin in a plant cell? How would this be different in animal cells?

   The flow of the energy seems to begin in the chloroplasts. The animal cells have less energy than the plant cells because there's more stuff going on in the plant cell then in the animal cell.

2. How quickly would the impact of a non-functioning organelle be noticed?

   They get impacted because a non-function organelle would be noticed fast depending on the cell, the Plant could also end up dying.

8. Are the functions of a cell from one tissue different than the functions of a cell from another plant tissue? Why or why not?

   Yes they would because all cells function in their own different ways.

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Activity 4.1.3 Student Worksheet

Table 1. *Organelle Relationships*

Organelle	Description of the Relationship	Dependent Organelle(s)
Leucoplast	Protein synthesized by the ER is stored in leucoplasts	Endoplasmic reticulum
Ribosomes	The nucleus sends information and supplements to the ribosomes so they can make protein and the nucleus uses the protein	Nucleus
Ribosomes	ribosomes make energy while the endoplasmic reticulum is like a highway system that transports things	Endoplasmic reticulum
Cytosol (cytoplasm)	They both release energy	Mitochondria
Nucleolus	The nucleolus produces the ribosomes	Ribosomes
Mitochondria	Chloroplasts enable photosynthesis so the mitochondria can produce energy	Chloroplasts
Vacuole	They both break down things for the better of the plant	Chloroplasts Peroxisomes
Vacuole	They create a structure for the plant	Cell wall
Peroxisomes	The peroxisomes breaks down hydrogen peroxide into water and oxygen, and chloroplast picks up the hydrogen and oxygen.	Chloroplast
Golgi	Lysosomes are packaged inside the Golgi	Lysosomes
Golgi	Peroxisomes are packaged inside the Golgi	Peroxisomes
Golgi	Secretory vesicles are packaged inside the Golgi	Secretory vesicles
Cytosol (cytoplasm)	The cytosol and the cell wall allow cells to go the direction it wants.	Golgi Cell wall
Endoplasmic reticulum	They both send different things to the cell surface.	Secretory vesicles
Nucleus	They both have protein that controls cells metabolism.	Cytosol (cytoplasm)