Topic 3: Cells – 3a. Organelle Assignment

Resources:

Miller, K., Levine, J. (2004). *Biology.* Boston, MA: Pearson Prentice Hall.

Wine, J. (1997). Organ-Specific Effects of Cystic Fibrosis [Internet]. Stanford University. Available from: http://www-psych.stanford.edu/~wine/organs.html

Pompe Disease [Internet]. Pompe Community. Available from: http://www.pompe.com/patient/learning/pc_eng_pt_lsds.asp

Wilson, J. Leigh Syndrome Health Article [Internet]. The Gale Group. 2002. Available from: http://www.healthline.com/galecontent/leigh-syndrome

Building on:

Teaching students about *organelles,* their *functions and their structure,* can be a little dull. For many students this is the first time they have ever encountered mitochondria, lysosomes, Golgi apparatus, etc. Rather than showing them pictures or having them fill out charts, this activity forces them to think about the function of each organelle and associate that function with an object that is familiar to them.

Links to Chemistry and Physics:

Form and function

Stories:

There are many diseases that are caused by the malfunction of specific organelles. Students are fascinated by diseases; students can be asked to predict what they think would happen when a specific organelle or cell structure does not function properly. Specific maladies can then be used to respond to their hypotheses. Here are a few of these organelle-driven problems:

Malfunction of the *cell membrane: Cystic Fibrosis* – One of the causes of the symptoms of cystic fibrosis is a defect in the calcium and chlorine ion channels in the cell membranes, thus producing abnormal amounts of fluid and salts in specific organs.
http://wwwpsych.stanford.edu/~wine/organs.html

Malfunction of the *lysosomes: Pompe Disease* – The inability of the lysosome to break down macromolecules like glycogen causes a build-up of those substances in the lysosome leading to progressive muscle weakness due to the lack of monomers available to the mitochondria for cellular respiration.
http://www.pompe.com/patient/learning/pc_eng_pt_lsds.asp

Malfunction of the *mitochondria: Leigh Syndrome* – The inability to effectively produce ATP due to a defective mitochondrial gene for one of the ATPase enzymes. Symptoms start in the central nervous system and are progressive.
http://www.healthline.com/galecontent/leigh-syndrome

Teacher Instructions for the Activity:

In this activity students are divided into groups of four. Each member of a group will be assigned four organelles and/or cell structures. The students' assignment is to go home and find a common object around their home (they are not to go out and buy anything) for each cell organelle or structure assigned. The object must represent the *function* of the organelle or structure, NOT its appearance. I emphasize this by telling the students that if they are assigned a chloroplast and they bring in a green ball, unless they have a reason why the function of the ball corresponds to the function of a chloroplast, they will not get any credit. I give them some examples of things brought in from past years: little sister's bike helmet, golf clubs, a loaf of bread, etc. I don't tell them what organelle those items had represented. One note of caution: be sure to tell them that water bottles, cell phones, and parts of cell phones will not be accepted (it is too easy for the student that forgot the assignment to rummage through the recycle bin or grab their cell phone).

Each student will need to fill out the first sheet of this activity naming their organelles/structures, the common object for each and the reasoning behind their choice. This is the part of the activity you will probably grade. You are looking to see if their reasoning (however far-fetched) is consistent with the function of the organelle/structure.

When the students come into class, tell them to get their objects and, as a group, go to their assigned lab table. Using small pieces of paper, they should letter each of the objects, leave them on the table, and then sit down.

Each lab group will be assigned a table other than their own and, as a group, they will go to that table and fill out the second sheet in this activity. Their challenge is to take each item on that table, assign it to an organelle/structure it could represent, and explain the reasoning behind the decision. It doesn't matter if they match the original group; the point is to make them think about the functions of the organelles.

Students generally like this activity and continue to refer back to specific items when they talk about certain organelles (mitochondria = battery; food chopper = lysosome) throughout the year.

The following is a list of the organelles/structures that I assign:

Nucleus	Golgi apparatus	Centrioles
Cytoplasm	Ribosome	Vacuoles
Cell wall	Mitochondria	Flagella
Cell membrane	Chloroplast	Cilia
Smooth endoplasmic reticulum	Lysosomes	Nucleolus
Rough endoplasmic reticulum		

Cell Organelle Assignment

Name of organelle _____

Common object used to represent organelle _____

Reasoning:

Name of organelle _____

Common object used to represent organelle _____

Reasoning:

Name of organelle _____

Common object used to represent organelle _____

Reasoning:

Name of organelle _____

Common object used to represent organelle _____

Reasoning:

Biology Group Names:

Table Evaluated: _____

Object Letter	Object Name	Organelle/Structure Represented	Reasoning
A			
B			
C			
D			
E			
F			
G			
H			
I			
J			
K			
L			
M			
N			
O			
P			