Hands-on Activity: Cell Membrane Color Sheet and Build a Cell Membrane

Contributed by: VU Bioengineering RET Program, School of Engineering, Vanderbilt University

Quick Look

Grade Level: 10 (8-11)
Time Required: 15 minutes
Expendable Cost/Grp: US$ 0
Group Size: Not defined
Activity Dependency: Cell Membrane Structure and Function

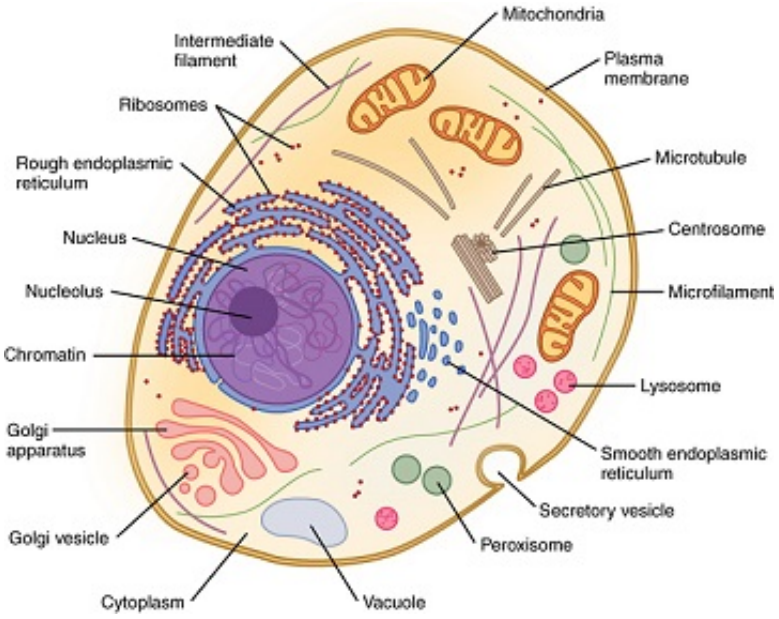
Related Curriculum

Subject Areas: Algebra, Data Analysis and Probability, Life Science, Measurement, Problem Solving

more...

Curricular Units: Keepers of the Gate

Lessons: Cell Membrane Structure and Function



Students learn about the animal cell and its components

Summary

Students color-code a schematic of a cell and its cell membrane structures. Then they complete the "Build-a-Membrane" activity found at http://learn.genetics.utah.edu. This reinforces their understanding of the structure and function of animal cells, and shows them the importance of being able to construct a tangible model of something that is otherwise difficult to see.

Engineering Connection

To understand intracellular engineering, students must have a basic understanding of the cell and cell mechanics. Through this activity, students take a hands-on approach by identifying and shading cell components on a cell diagram, as well as building a cell membrane model. Through this exercise, they relate building and design with science structure. Buiding models is a common approach used in the engineering design process, especially to study or manipulate objects that are at scales too difficult to see. Engineers often build models of cells to better study and understand how their structure and functions are related.

Educational Standards

- International Technology and Engineering Educators Association: Technology
- National Science Education Standards: Science
- Next Generation Science Standards: Science

Pre-Req Knowledge

Students should have completed the associated Cell Membrane Structure and Function lesson and have a basic understanding of cell structures and their functions.

Learning Objectives

After this activity, students should be able to:

- Define the relationship between the structure and function of a cell membrane.
- Describe the different types of membrane proteins.
- Build a model cell membrane.

Materials List

Each group needs:

- colored pencils
- tape and scissors
- different colored paper
- Animal Cell Coloring Sheet, one per student, available at http://www.biologycorner.com/worksheets/cellcolor.html

To share with the entire class:

- Build-a-Membrane template and instructions, available at http://teach.genetics.utah.edu/content/begin/cells/print/BuildAMembrane.pdf

Introduction/Motivation

Ever wonder why things are arranged as they are? Is there a reason for it or are arrangements, such as cell organelles, just random?

In this activity, you will construct a cell membrane. You will also color-code a schematic of a cell and its organelles. Doing this will help you to understand where things are in a cell and why they are in specific positions.

Cells are the basis unit of life. Chemical and biomedical engineers study cells and their composition as part of designing innovative technologies to advance the medical health industry. However, cells are difficult for us to see, so engineers often build models of cells to better study and understand how their structure and functions are related.

Vocabulary/Definitions

cell membrane: A semi-permeable membrane that encapsulates a cell's cytoplasm.
membrane protein: A protein molecule attached to the membrane of a cell or organelle.
organelle: A structure in a cell that performs a specified task or function. Found in eukaryotic cells.

Procedure

Background:

Nanoparticle research has become a focus in the field of biomedical engineering due to its use for drug delivery and other applications. To understand what is happening inside of the cell, students must understand how the particles enter the cell as well as its structure. A model of the cell helps students see how cell membrane structure and function, and also provides the level of detail needed by engineers to facilitate ease of entrance in their designs. First, students use colored pencils to shade in a cell diagram. As they write down the functional part of each organelle, they begin to understand placement and arrangement. Taking this a step further, students construct their own models of cell membranes. These "membrane-pieces" assemble with those from other groups in the class to form a large cell membrane model.

Before the Activity

- Gather materials and make copies of the Animal Cell Coloring Sheet, available at http://www.biologycorner.com/worksheets/cellcolor.html.
- Obtain from the University of Utah's Teach Genetics website the instructions and templates for the Build-a-Membrane activity at http://teach.genetics.utah.edu/content/begin/cells/. Make enough copies of the templates for all students. Either print out the instructions, or have students read them online.

With the Students

1. Distribute the materials and worksheets for the cell coloring page.
2. Make sure all students read the instructions carefully. This is a wonderful student-directed activity, so let them investigate and only provide instructions and guidance as they ask questions.
3. Once students have completed the coloring portion, divide the class into small groups and direct them to the Build-a-Membrane exercise, following the instructions found at http://teach.genetics.utah.edu/content/begin/cells/print/BuildAMembrane.pdf.
4. Conclude by assembling together the "membrane-pieces" with those from other groups in the class to form a large cell membrane model. Ask students the Investigating Questions.

Investigating Questions

- What are some of the structures within a cell?
- What are their functions?

- What is nanoscience, and how does it relate to studying cells?
- Why is it important for engineers to build models of cells?

Assessment

Cell Membrane Models: At activity end, grade students on their final cell membrane product.

Additional Multimedia Support

Source of Animal Cell Coloring Sheet: http://www.biologycorner.com/worksheets/cellcolor.html

Source of Build-a-Membrane activity: http://teach.genetics.utah.edu/content/begin/cells/

References

Dictionary.com. Lexico Publishing Group, LLC. Accessed June 21, 2010. http://www.dictionary.com

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Supporting Program

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