NOTE: This is a computer lab lesson. Make sure you have signed up for the lab prior to class today. If your computer lab does not have Internet access, you must download the molecule files before class. See **Protein Explorer Setup** for more information about this.

TITLE OF LESSON

Biology Unit 1 Lesson 11 – Protein Explorer and Observation of Molecules Continued
How do things flow in and out of a cell?

TIME ESTIMATE FOR THIS LESSON

One class period

ALIGNMENT WITH STANDARDS

California – Biol CB 1; IE 1

MATERIALS

Protein Explorer, http://molvis.sdsc.edu/protexpl/index.htm
Protein Explorer Instructions – Student Page
Computer lab, preferably with Internet access
Netscape 4.7 installed on computers

LESSON OBJECTIVES

- To learn to use a computer program to observe molecules and membranes
- To understand molecular form and interactions by rotating molecules in 3D

FOCUS AND MOTIVATE STUDENTS – WARM-UP ACTIVITY

1) Homework Check – Have students take out the second draft of their Lab Report #1. Sign all completed drafts. Collect all reading homework and flash cards.
2) Agenda – Have students copy the agenda you have posted.
3) Computer Protocol – Remind students of the computer etiquette for your class and the consequences for any misbehavior.
4) Review – Have students open Protein Explorer. Review each image from yesterday with students. Call on students randomly to explain the function of each molecule.

ACTIVITIES – INDIVIDUAL AND GROUP

1. Complete Lesson 10 Images – Finish viewing and taking notes on any images they missed from yesterday.

2. Lipid Bilayers – Today, they will look at lipid bilayers with Protein Explorer using the **Protein Explorer Instructions** handout. Please use either the PROTEIN EXPLORER ON-LINE instructions in the handout or PROTEIN EXPLORER OFF-LINE instructions in the handout, depending on your Internet capabilities. If using the on-line method, have the students enter the following URL: http://molvis.sdsc.edu/bilayers/. If using the off-line version, they will first need to open Netscape, then open the file that contains the previously-downloaded lipid bilayer file (example: C:\protein explorer\chime\bilayers.) Tell them to click on the *Start Presentation* button. In either case they will see three windows. The one above contains information about the molecule and what buttons to click. The window below contains the molecule. The window on the left side gives instructions on how to resize the windows.

3. Cholesterol – Have them read the information and then click the first button (gray button with an X on it) to bring the first image of cholesterol onto the screen.

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4. Instructions – Have each student take out a separate sheet of paper as was done yesterday. At the top, they should write the title, Protein Explorer and Observation of Molecules. Then have them split the page in half. On the left hand side, they should write the molecule name and sketch it. On the right hand side, they should write structure and function. Tell them as they view each molecule, they will need to write the molecule name in the left hand side and draw a sketch of it. Then in the right hand side they will need to describe the molecule's structure and its function. Explain they will have the rest of the period to work on this. They must view all of the molecules by the end of the period. You will be collecting their notes for credit at the end of the period. Quickly explain to them steps 5-9 below. Then allow them to work quietly for the rest of the period.

5. Moving Images – They should move or rotate the molecule by clicking the left mouse button and moving the mouse. They should rotate each molecule to get the most information from it, as it will provide a clearer 3D image if they move it around. Each atom has a different color in this program. For example, white = hydrogen, red = oxygen, blue = nitrogen, gray = carbon, and orange = phosphorous

6. Reading Information – Continue to read the information given and click the next button to move through the whole series on cholesterol.

7. Phospholipids – Click Next page (Phospholipid) to continue with the next series. Continue as before reading, clicking buttons, rotating the molecules and taking notes.

8. Repeat Presentations – After going through the presentation the first time, they can repeat the presentation to pick up on any points they missed.

9. Right Click – They should also use the right button on their mouse to change the many aspects of the molecule they learned about during the explanation of the program such as display, rotation, color, selection particular molecules, etc. They should spend the rest of the class exploring these in order to understand lipid bilayers better.

10. Homework Review – Five minutes before the end of the period, have students turn in their notes, clean up their work station and shut down their computers. Remind them of their homework and ask them to go directly to the computer lab tomorrow.

HOMEWORK

1) Have one adult edit the second draft of your Lab Report #1 according to the instructions in your **Lab Report #1 Requirements** sheet.
2) Read chapter 13 to chapter 15 pp. 65-74 in *The Double Helix*. Write at least 5 questions you may have about the ideas posed in the text and attempt to answer them based on past readings and any prior knowledge you may have about the subjects.
3) Organize binders according to date and section. Due Lesson 15.

GROUP ROLES

Students will be working in their pairs again today.

DOCUMENTATION FOR PORTFOLIO

None

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