The Dynamic Cell Membrane

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Students have a difficult time visualizing the fluid nature of the cell membrane. This is an important concept and worth the 6-10 minutes it takes to demonstrate.

Materials:

Aluminum Foil
Signs - Marker, Channel, Carrier
Optional - goofy hat for marker protein, tube for channel protein, etc
Whistle or some noise maker
Tennis ball, beach ball

For a class of 24, you need an area about 24-30 feet (move the desks or go out in the hall.) Lay down a piece of foil on the floor. The students will stand on this, so it needs to be 20-30 feet in length depending on your class size. Ask for 3 volunteers to be the Marker, Channel and Carrier Protein. Attach the signs to their shirts. All the other students will be phospholipids. Each phosphoro-lipid will have a number. Count off by 4's. Have the phospholipids stand on the foil. Explain their roles:

#1 - will touch their toes every 3 seconds.
#2 - will turn around and around
#3 - will take a step forward two steps to the right and then step back (this will make them change position
#4 - will do all the actions of #1, #2, and #3 (I first tell them they will have to stand on their heads but due to safety concerns we will imagine the phospholipids flip flopping)

Position the proteins in between the student phospholipids. All should be standing on the foil. (At this point, you can discuss the mosaic nature of the cell membrane) On the signal (whistle or other noise), all students will perform their movements. After 20-30 secs., stop them with signal. Make the necessary adjustments, discuss the movement of the proteins. Ask if anyone has questions. Students should then on the signal, perform for 20-30 secs more. The foil will get ripped and displaced. That's okay. Using the tennis ball to represent a small molecule like water, show that could pass between the phophoslipids (the students). Larger molecules (beach ball) can't pass between the phospholipids and must have help (proteins)When you stop them the second time, ask them to return to their seats and "reflect" silently on the demonstration.

Follow-up discussion:

Discuss the movement of the molecules that make up the cell membrane. After they have had some time to "reflect", discuss why the foil was an essential part of the demo. (It creates the bilayer, if they look down they will see themselves head and two tails (their legs)).
Discuss the role of the proteins. My marker protein wears a jester hat. We can then talk about the carbohydrates that extend off the protein for self recognition.