Name:

Block

* Read the Front Complete the Back

THE FLUID MOSAIC MODEL

Although we are still not certain exactly how the molecules comprising a membrane are actually put together, the model shown in this plate is the best integration of the known evidence that anyone has come up with so far.

Color the heading Phospholipid Bilayer and titles and structures A and B, using the light F and G colors from the previous plate.

This model is known as the fluid mosaic model because it hypothesizes that the membranes of a cell consist of phospholipid bilayers in which proteins and carbohydrates are embedded like the stones in a mosaic. Other lipids (not shown) are also present. The phospholipid bilayer appears to be in a somewhat fluid state, allowing most of the proteins to migrate within it. (Recall the cell fusion portion of Plate 35.)

Color the headings Protein Molecule and Glycocalyx and titles C, D, and E. Color the hydrophobic and hydrophilic portions of the three protein molecules in the center and right portions of the central drawing, saving the leftmost protein (with the arrow) for later. Also color the carbohydrate.

Some of the proteins in a membrane are exposed only to the exterior of the cell or only to the interior, while others extend all the way through the membrane. Attached to some of the proteins on the exterior surface are certain carbohydrate groups (collectively called the *glycocalyx*), some of which are believed to assist cells in responding to environmental changes and in "recognizing" one another and interacting in appropriate ways.

The positioning of the proteins within the lipid bilayer is easily understood if you remember (from Plate 19) that some of the amino acids making up proteins have hydrophobic ("water-fearing": nonpolar) side groups while other have hydrophilic ("water-loving": polar or ionic) side groups. If a particular protein is constructed so that one portion of it has mostly hydrophobic side groups on the surface while the rest of it has mostly hydrophilic side groups on the surface, that protein can only attach to a membrane with its *hydrophobic portion* embedded in the *hydrophobic region of the phospholipid bilayer* and its *hydrophilic portion* protruding from the membrane into the surrounding watery environment or into the cytoplasm, both of which are *hydrophilic.*

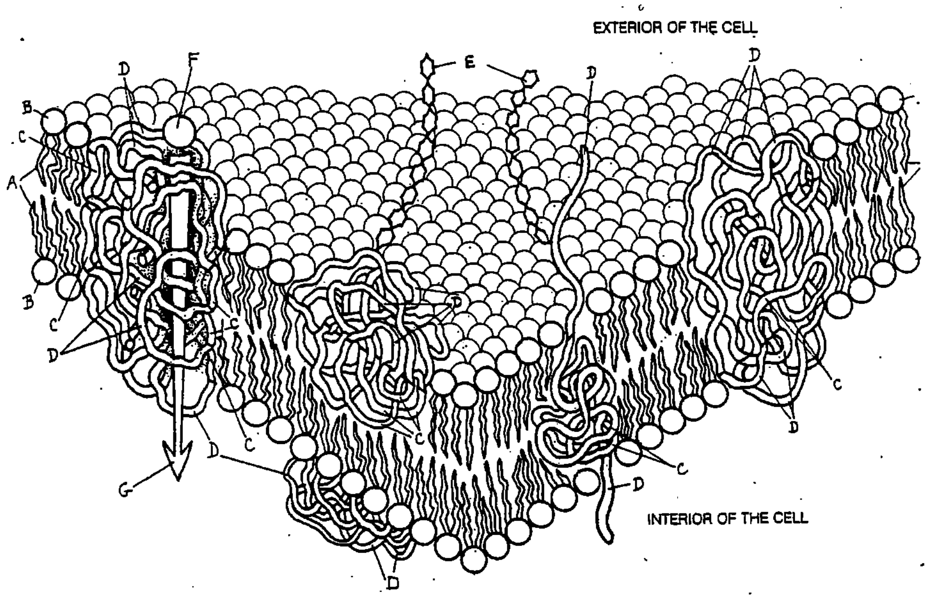
Now color the leftmost protein molecule, titles F and G, and the molecule and arrow.

One very satisfying feature of the fluid mosaic mod that it offers a possible explanation for the rapid *diffus* of *small polar molecules* across the membrane. We n only assume that some of the proteins have pores thro their centers lined with hydrophilic side groups that tract small hydrophilic (polar) molecules and allow th to pass through.

Color the remaining sections of the plate as y come to them in the following text. For illustrati purposes, the individual polypeptide chains of p teins are not shown, and only the hydrophobic a hydrophilic regions are distinguished. The bilayer shown only in the first pair of drawings.

The fluid mosaic model also offers several possible planations for facilitated transport and active transp We know from studies of the proteins of muscular c traction and of enzymes, which are proteins, that ma proteins change their tertiary and quaternary structu when ions or small molecules attach to them a from them. If a membrane protein has a certain part t attracts a specific ion or small molecule, that part mi move in some way to transport that ion or molec through the membrane.

There are four different hypotheses for such tra port. To simplify the discussion, only an *ion* is me tioned here, but a small molecule could be transpor in the same way. One hypothesis stipulates that a *m able arm* binds the ion to be moved, which causes shift in the distribution of electron energies in the pr tein molecule, which in turn causes the movable arm move down through the pore, taking the ion with it a releasing it on the opposite side of the membrane. second hypothesis assumes a sequence of *binding sit* when the ion binds to the first binding site, that cau changes that make the second binding site have stronger attraction for the ion, so it moves farther i that change causes the third binding site to develop stronger attraction, so the ion moves in farther, and on until it is all the way through. The third idea pr poses a traplike movement: the ion is attracted into cavity in the protein, but as soon as it is in the cavit the protein changes shape to close behind the ion a open in front of it so that the ion is essentially on t other side of the membrane already. A fourth h sis (regarded today as not really likely) assumes that t binding of the ion causes changes that make the prote flip over within the lipid bilayer, dragging the ion to t opposite side.



CELL MEMBRANE STRUCTURE and FUNCTION REVIEW - COLOUR-CODE Worksheet

List 4 functions of the cell or plasma membrane: (SEE MY POWERPOINT SLIDE #1)

a. ______________________________

b. ______________________________

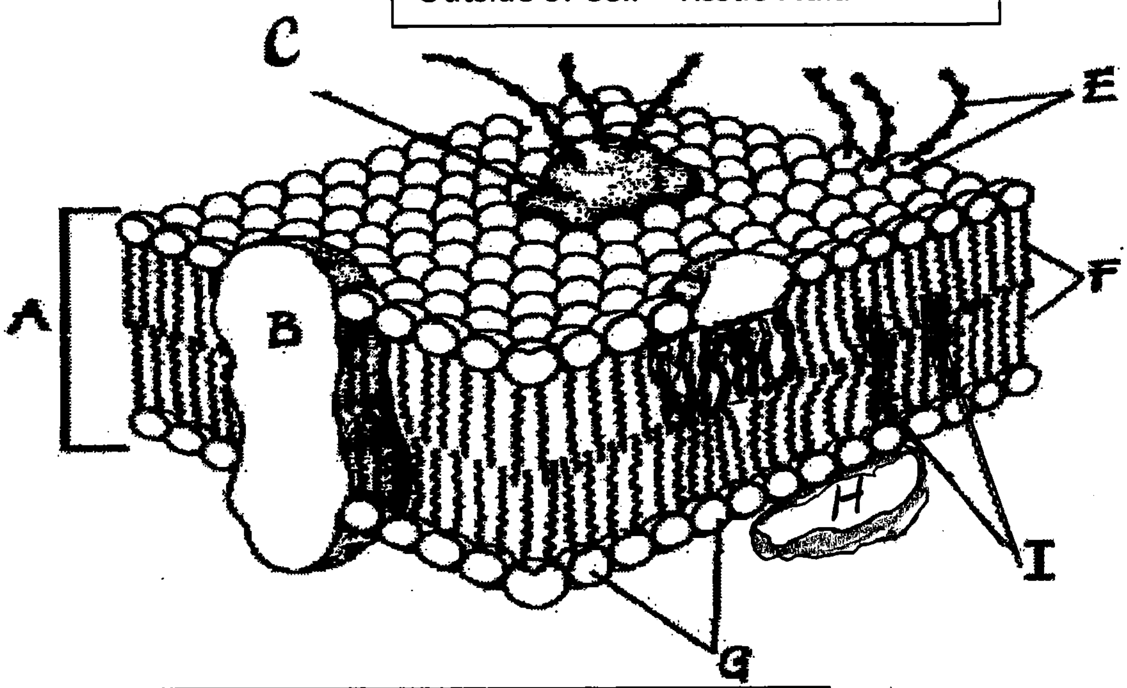
c. ______________________________

d. ______________________________

Correctly ***color code and identify*** the name for each part of the cell membrane.

Letter	Name/Color	Letter	Name/Color
_____	Phospholipid bilayer (no color)	_____	Peripheral protein (red)
_____	Integral protein (pink)	_____	Cholesterol (blue)
_____	Fatty acid tails (orange)	_____	Glycoprotein (green)
_____	Phosphate heads (yellow)	_____	Glycolipids (purple)

Outside of Cell – Tissue Fluid



Inside Cell – Cytosol Fluid of Cytoplasm

Match the cell membrane structure or its function with the correct letter from the cell membrane diagram.

Letter	Structure/Function	Letter	Structure/Function
_____	Attracts water	_____	Repels water
_____	Helps maintain flexibility of membrane	_____	Make up the bilayer
_____	Involved in cell-to-cell recognition	_____	Help transport certain materials across the cell membrane