

An impressionist painting with a textured, visible brushstroke style. The background features a mix of warm and cool colors, including yellows, oranges, greens, and purples, creating a sense of light and atmosphere. A white rectangular box is overlaid on the lower-left portion of the image, containing text.

## 1. **Pick up** Name Folder

- Pick up name folder and set it up at seat.

## 2. **Sit** with your lab group.

- laptops almost closed (avoid distracting)

## 3. **Clicker** Attendance

- Launch your Top Hat, and get ready to click.

# Announcements

## Wireless Emergency Alert (WEA) Test Scheduled for March 19, 2025

March 17, 2025

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EAST LANSING, Mich. --- As part of Michigan's Severe Weather Awareness Week, Michigan State University (MSU) is participating in a TEST of the Wireless Emergency Alert (WEA) system. This test will take place in the Tri-County area, which includes Clinton, Eaton, and Ingham Counties, along with the City of Lansing, on March 19, 2025, at 12:59 p.m. Eastern Time. This scheduled alert precedes the Voluntary Statewide Tornado Drill, which will begin at 1:00 p.m. ET.

### **The WEA message will read:**

"TEST TEST TEST: This is a TEST of your phone's Wireless Emergency Alert (WEA) system. Clinton, Eaton, and Ingham Counties and the City of Lansing are sending this TEST as part of Michigan's Severe Weather Awareness Week. You may also hear the outdoor warning (tornado) sirens activate as part of the Statewide Voluntary Tornado Drill. THIS IS ONLY A TEST!"

This alert will be issued by Ingham County Emergency Management on behalf of Ingham County, Eaton County, Clinton County, and the City of Lansing Emergency Management Programs.

### **Details of the WEA Test:**

**Who:** Ingham County Emergency Management on behalf of Michigan State University

**What:** Issuing a Public Alert Test as a "Civil Emergency Message" to all active cell phones in the tri-county area

**When:** March 19, 2025, at 12:59 p.m. ET

**Why:** To evaluate the effectiveness of alert systems in providing emergency information on a regional level. This test

# Announcements

1. WEA test today at 12:59pm.
2. Course Feedback: 21 people participated so far.

qualtrics<sup>XM</sup>

Mar 7, 2025, 5:00 PM - Mar 14, 2025, 6:00 PM

## Mid SALG

Survey digest

Here's how your survey is doing

You received an additional 21 responses since Mar 7, 2025, 5:00 PM

[View responses](#)

# Announcements

1. WEA test today at 12:59pm.
2. Course Feedback: 21 people participated so far.
3. Take home exam (do not share your text with others, just your ideas). Avoid turnitin.com problems.
4. Exam **#2**: Review instructions/expectations (on the first page of the exam provided on D2L).

**LB-145 Exam II has two parts (Part 1 is worth 33%)**

*If you complete & submit this early, you will gain 1% bonus per day early [up to 10%]  
The digital copy does not have to contain illustrations, but the hard copy does.*

*Part 1 of your exam is an open-book, open library, and open internet,  
and you are encouraged to discuss these questions with members of your lab group.*

*\*But\* write your answers on your own, in your own words, as described below.*

- You have until midnight Sunday, March 23rd to compose answers to all questions listed. You will turn in your answers by uploading them to [turnitin.com](http://turnitin.com) by midnight (11:59pm) Sunday night and submitting a hard copy by 12:40pm at lecture the next day, Monday, March 24th.
- For blind-grading purposes be sure to only list B-PIDs on any pages.
- Note: skipping a required question means you haven't yet completed the exam.
- The text of your answer must be submitted to <http://turnitin.com/> by the deadline, yet since this is an exam, only submit your final answers, not drafts, and be aware you will not be able to view the “similarity report.” \*Be careful to not insert photos that are high-resolution because [turnitin.com](http://turnitin.com) may reject your exam when you attempt to submit it (file must be less than 100MB). *Be sure to verify you can login to [turnitin.com](http://turnitin.com) well before the due date.*
- We will randomly choose one question from lab & one from lecture and grade those.
- On Wednesday, March 26th you'll then take Part 2 of Exam II. It will be a closed-book in-class test built ONLY from a subset of these same questions. During the test, you may bring and use a 3x5 index card with handwritten notes.
- This page should be as a cover sheet on your hard copy, that is "signed" below.

Back to Biology...  
(last time)

## 5.1 Components and Structure

**Summary:** By the end of this section, you will be able to:

- Understand the fluid mosaic model of cell membranes
- Describe the functions of phospholipids, proteins, and carbohydrates in membranes
- Discuss membrane fluidity

Structure and Function of Plasma Membranes (OSB)

 Quiz Me 5.1 > Components and Structure

Use Flash Cards as Student

## 5.2 Passive Transport

**Summary:** By the end of this section, you will be able to:

- Explain why and how passive transport occurs
- Understand the processes of osmosis and diffusion
- Define tonicity and describe its relevance to passive transport

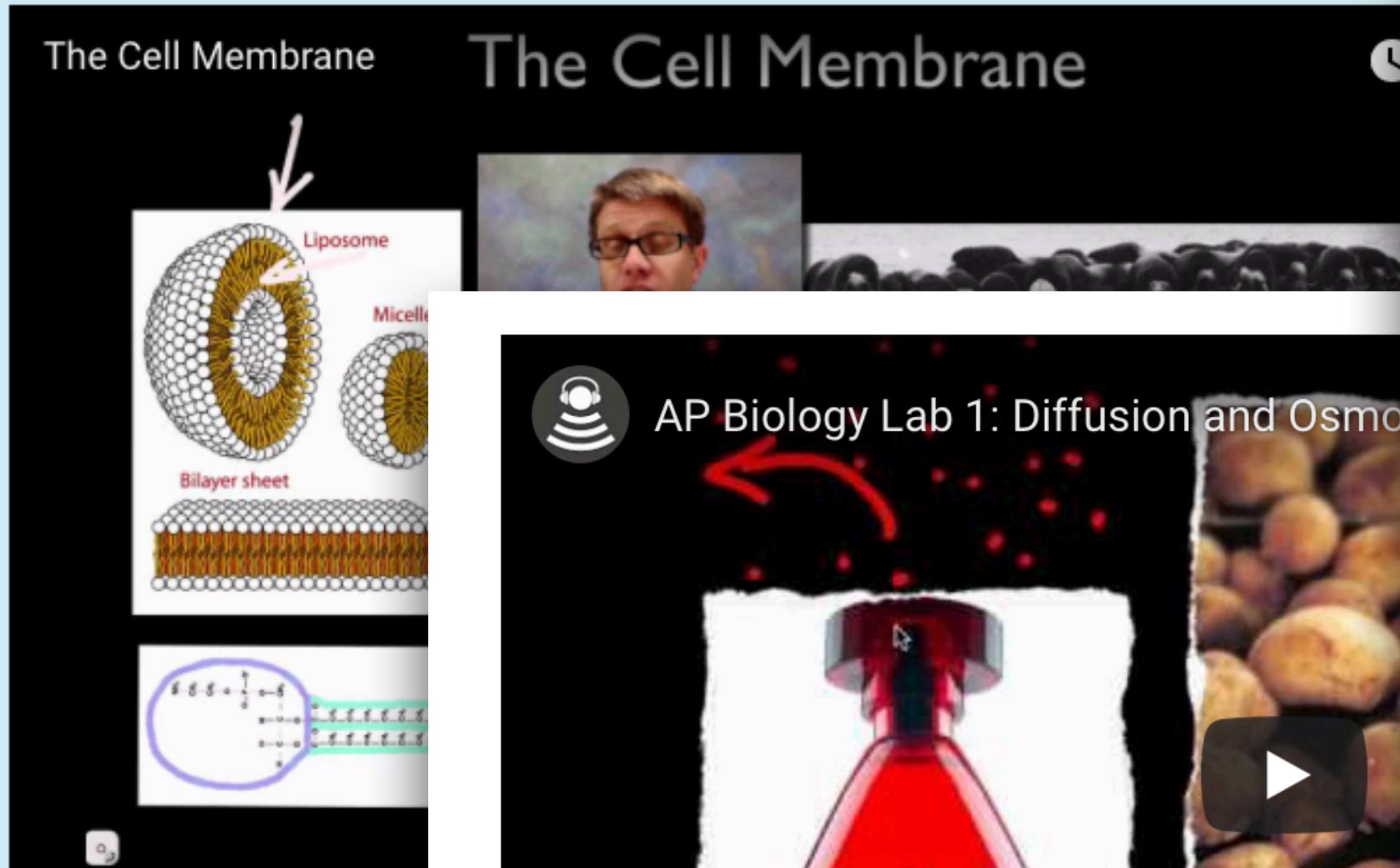
Structure and Function of Plasma Membranes (OSB)

 Quiz Me 5.2 > Passive Transport

Use Flash Cards as Student

## Link to Learning

A brief introduction to the cell membrane.

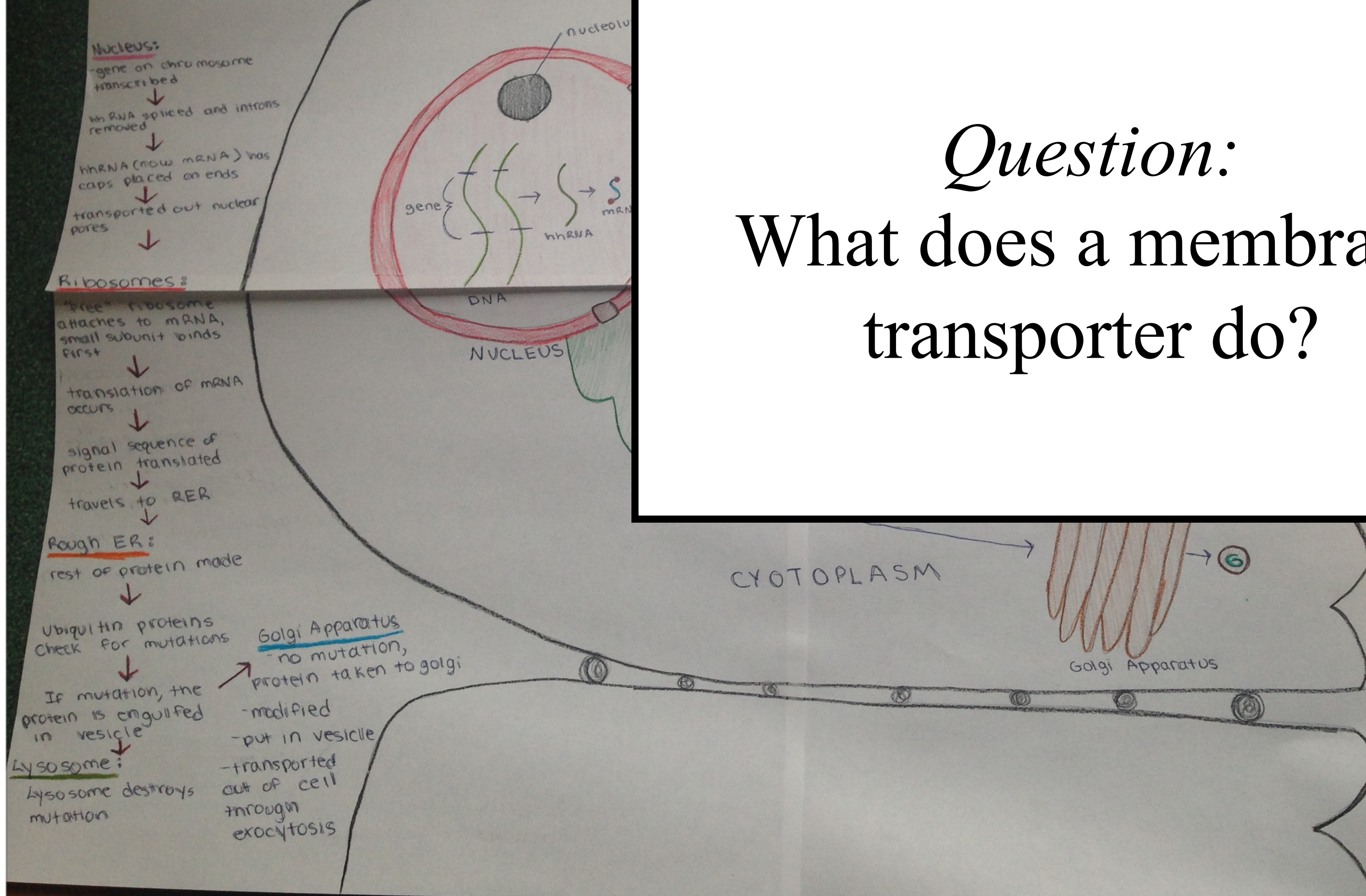


A brief description of diffusion and osmosis.

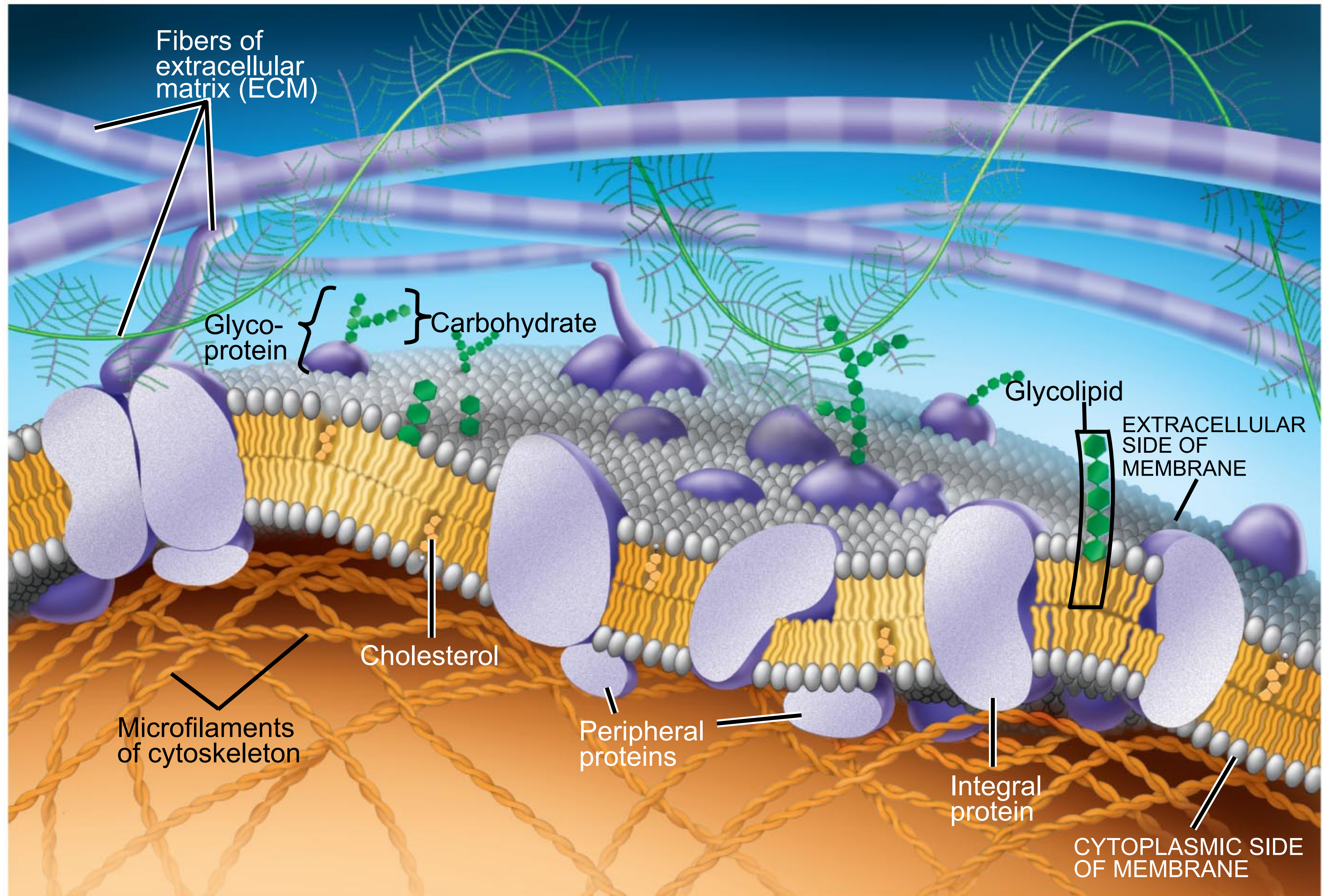
Cell and Molecular Biology - Lipids and Membranes  
youtube.com

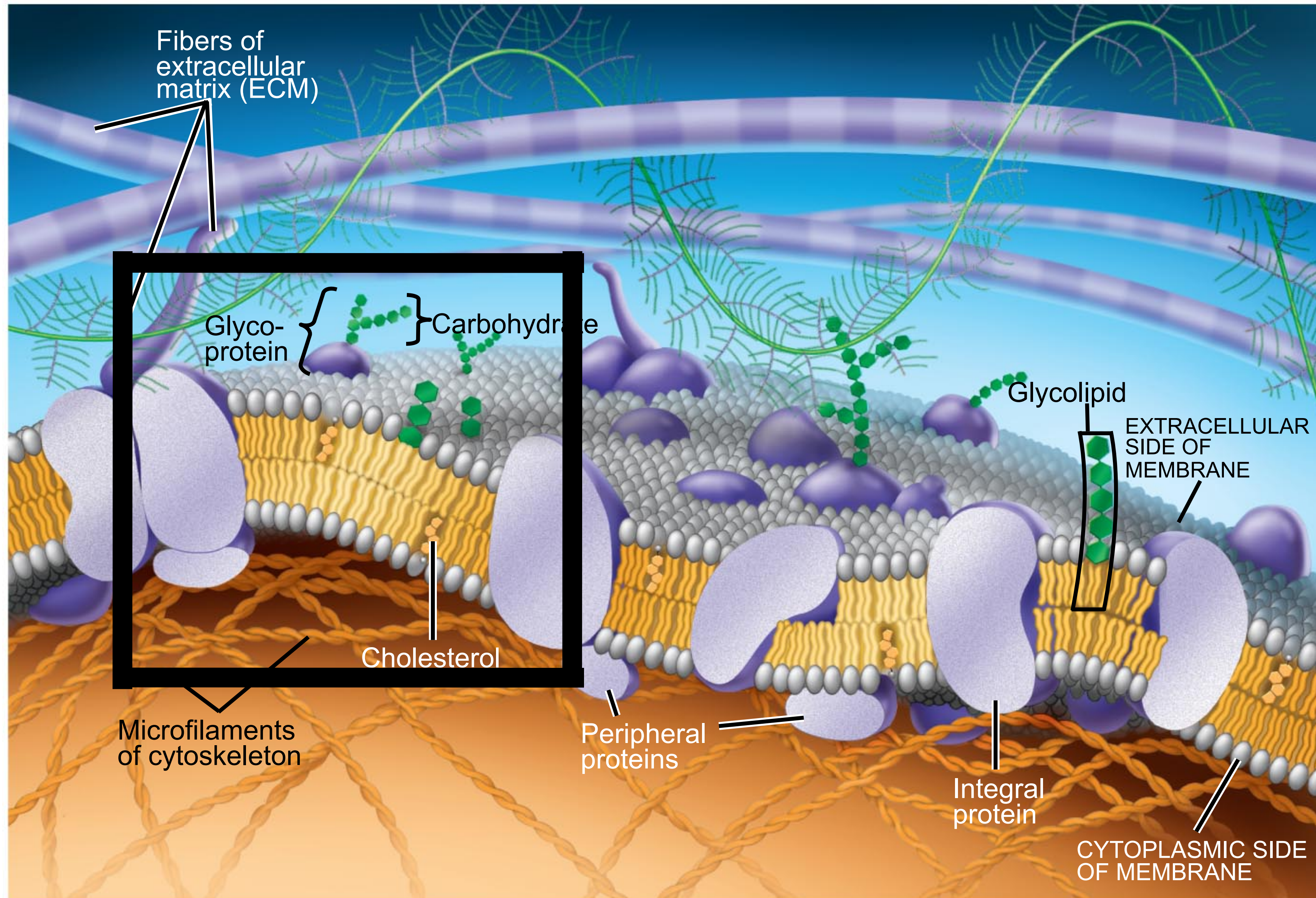
Diffusion and

# Epithelial Cells

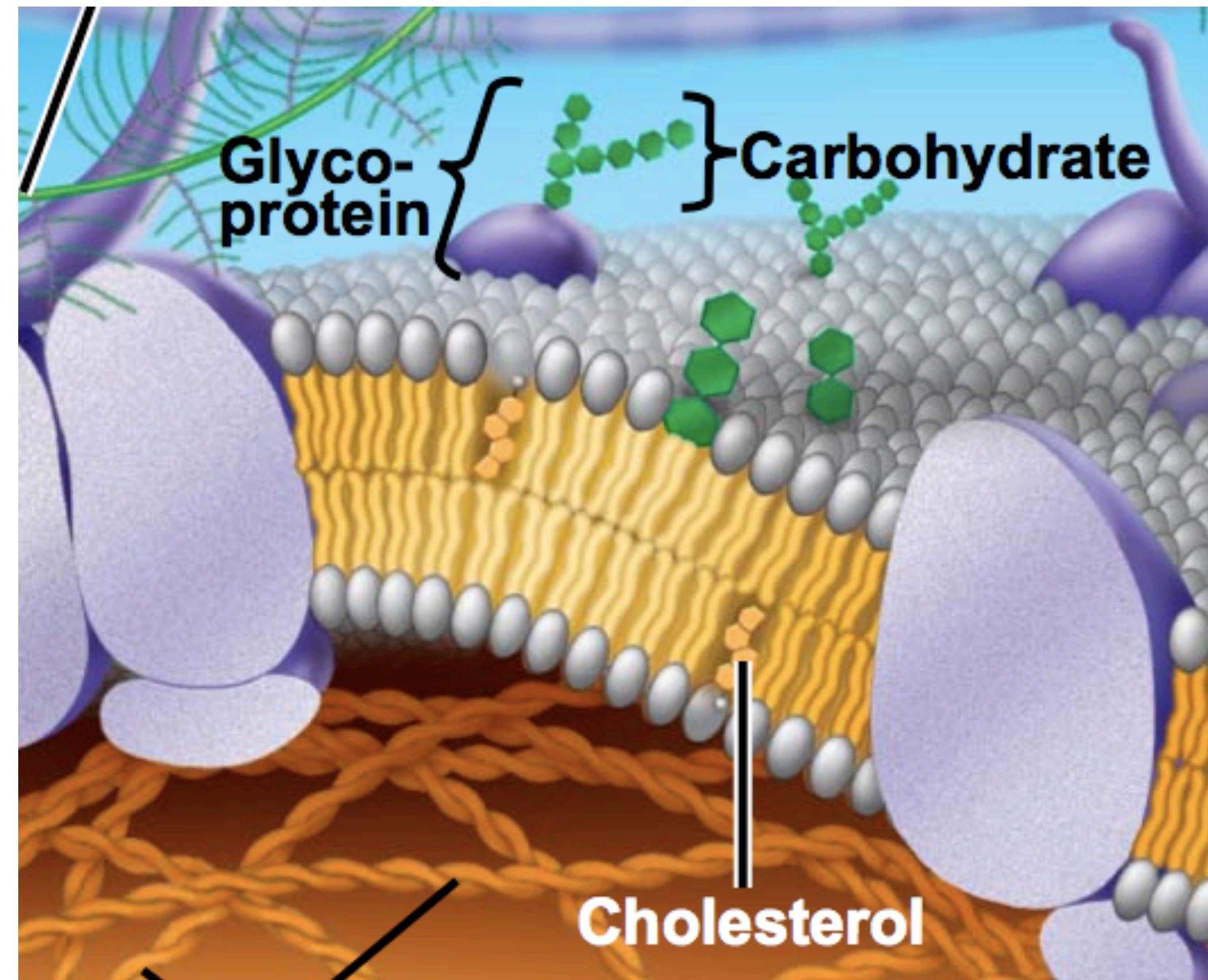


*Question:*  
What does a membrane transporter do?

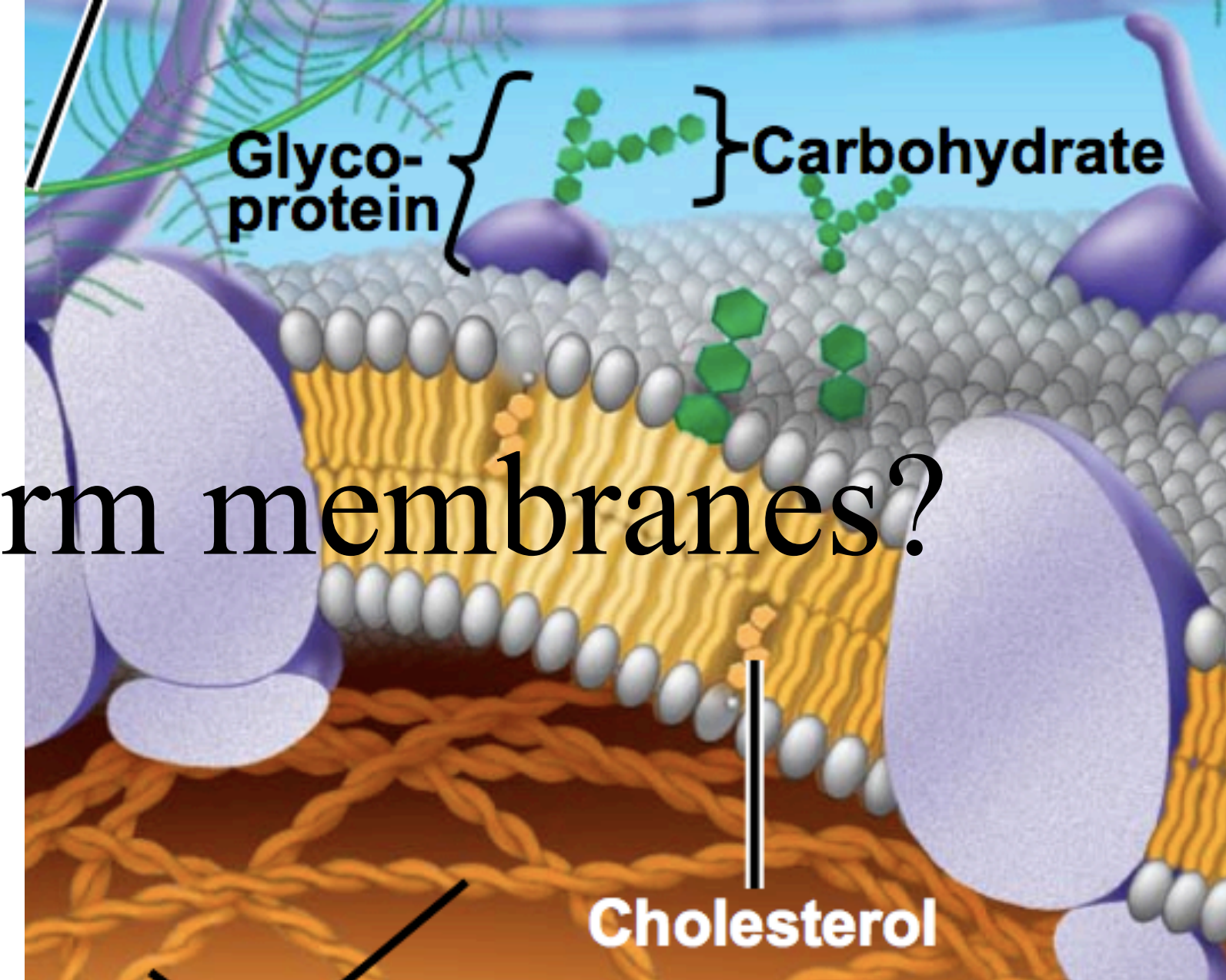




# Why do phospholipids form membranes?

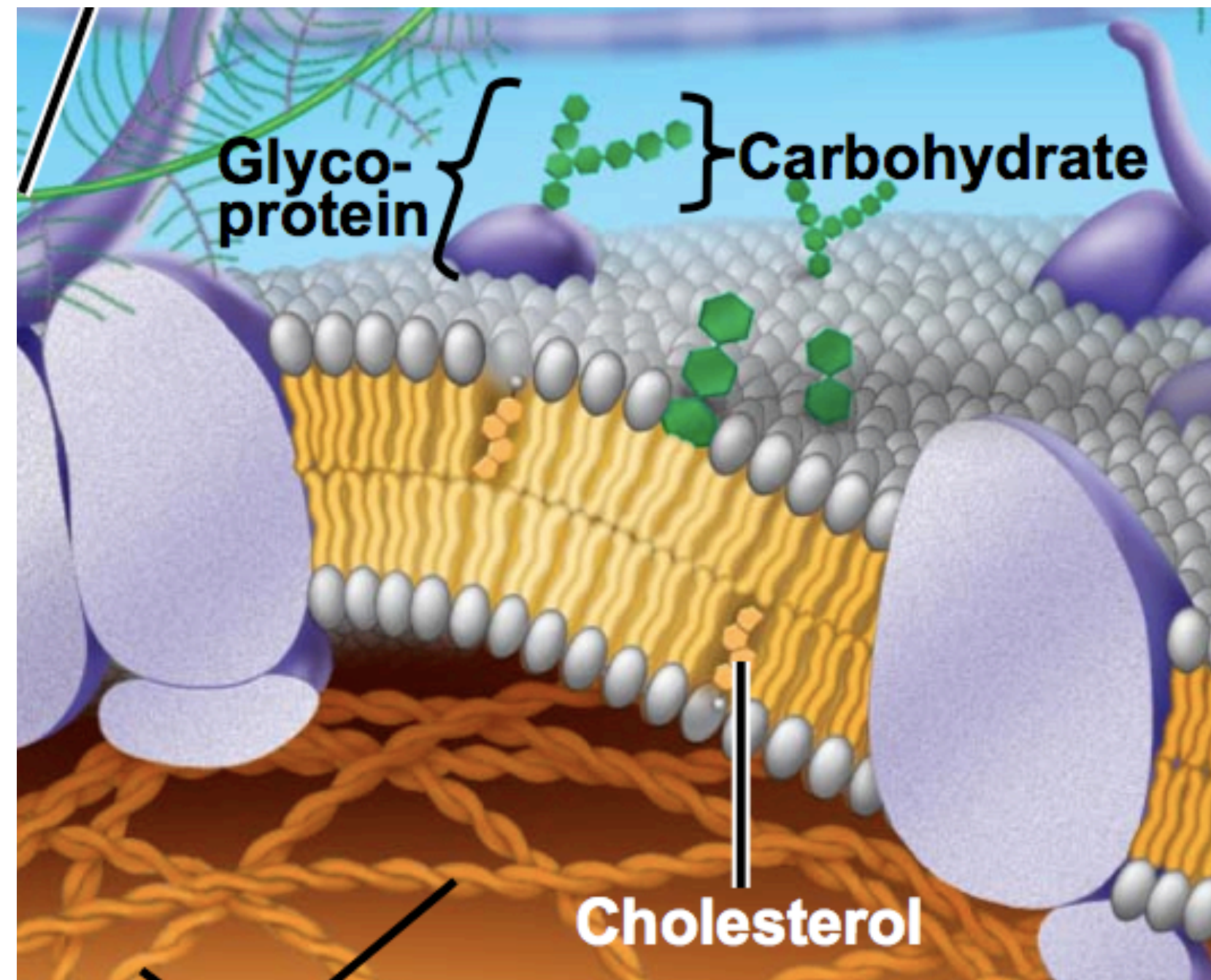


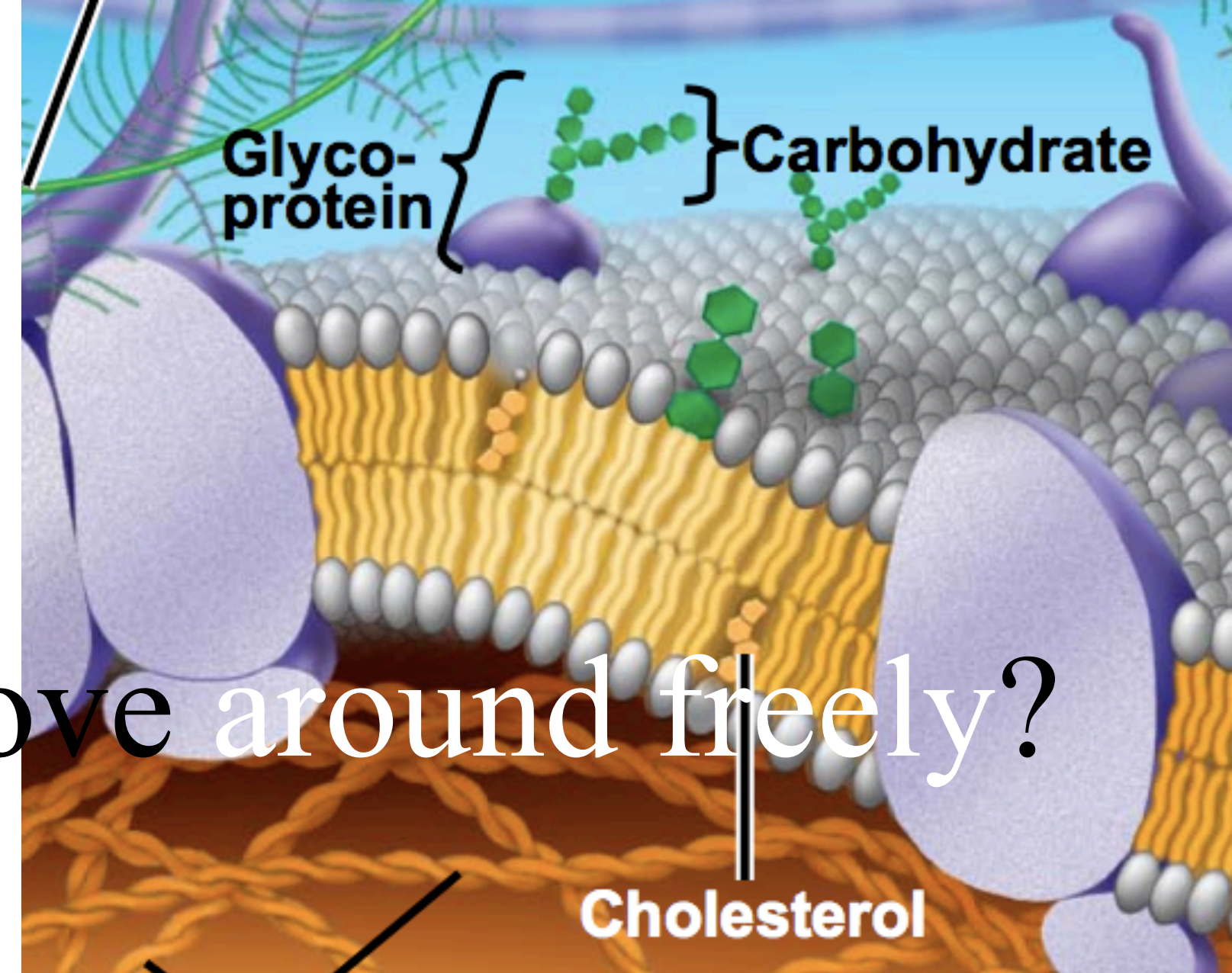
Why do phospholipids form membranes?



- A. yellow tails fear water
- B. yellow tails are bound together
- C. gray heads are bound together
- D. SER makes membranes that way
- E. ER makes membranes that way

Can phospholipids move around freely?

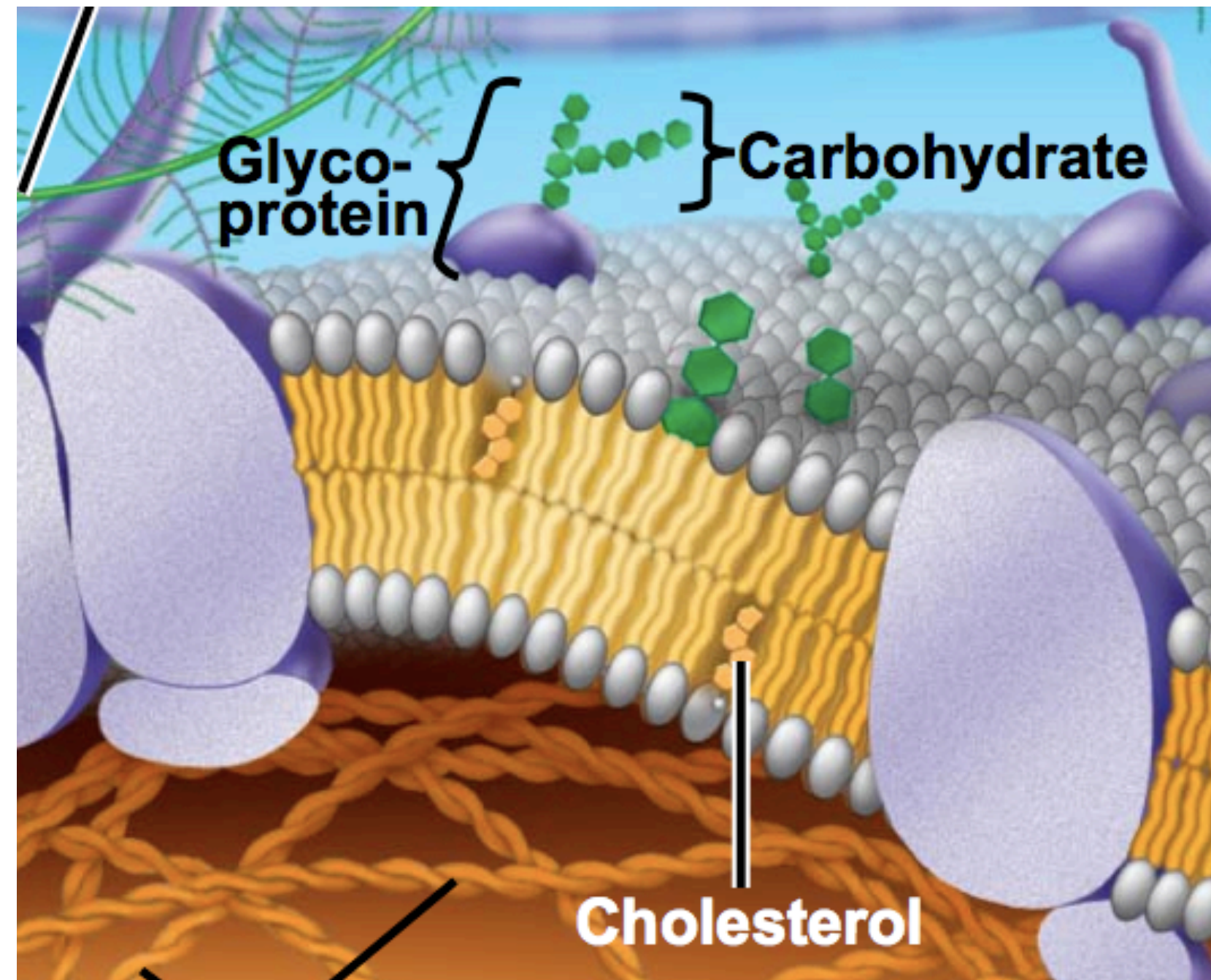




Can phospholipids move around freely?

- A. yes, they can join or leave the membrane at will
- B. kinda, they can move side to side but not flip flop.
- C. no, they are often bound to the cytoskeleton.
- D. yes, they can move side to side or flip flop easily.
- E. yes, but the purple proteins cannot move.

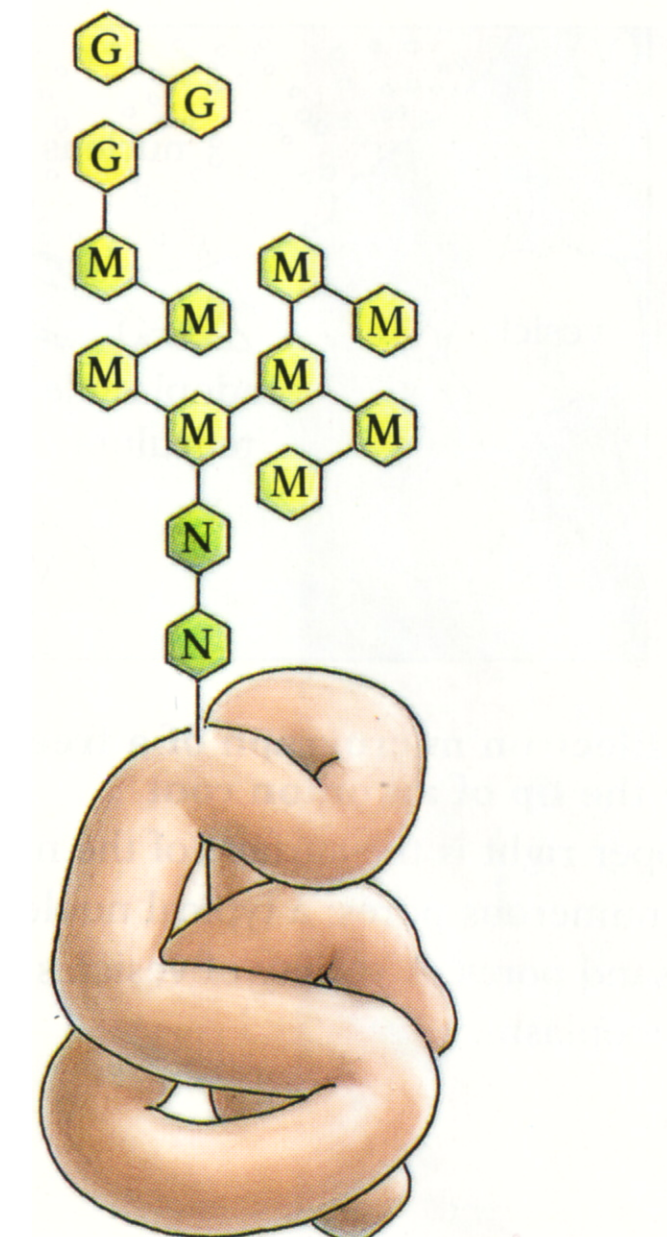
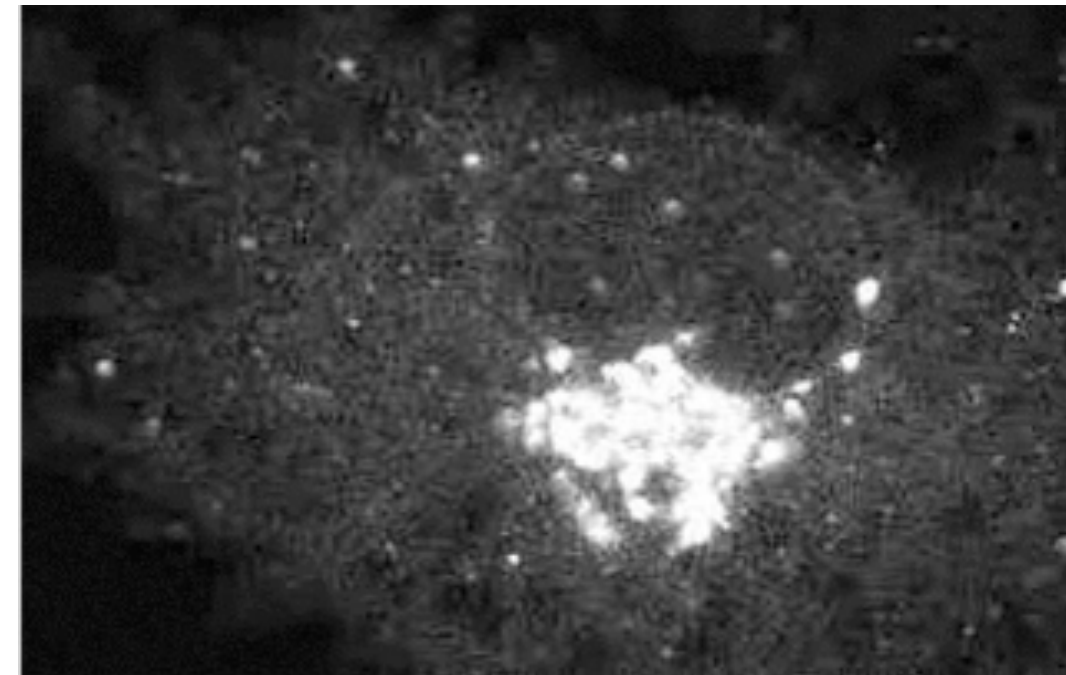
Glycoproteins are proteins + **sugar**

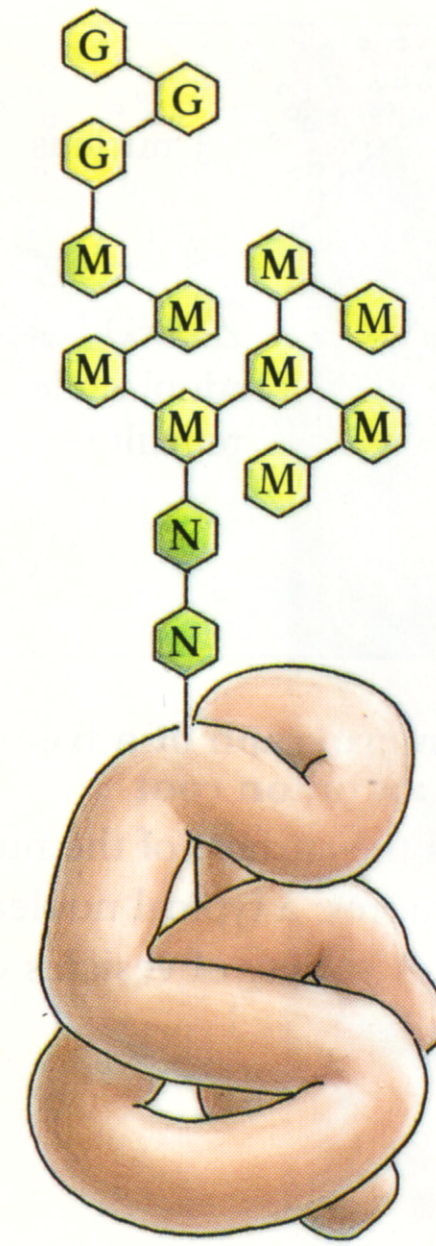


Where in the cell do newly made proteins first gain sugar groups?

Where in the cell do newly made proteins first gain sugar groups?

- A. ER
- B. Golgi
- C. Nucleus
- D. vesicles that fuse with plasma mem.
- E. plasma membrane

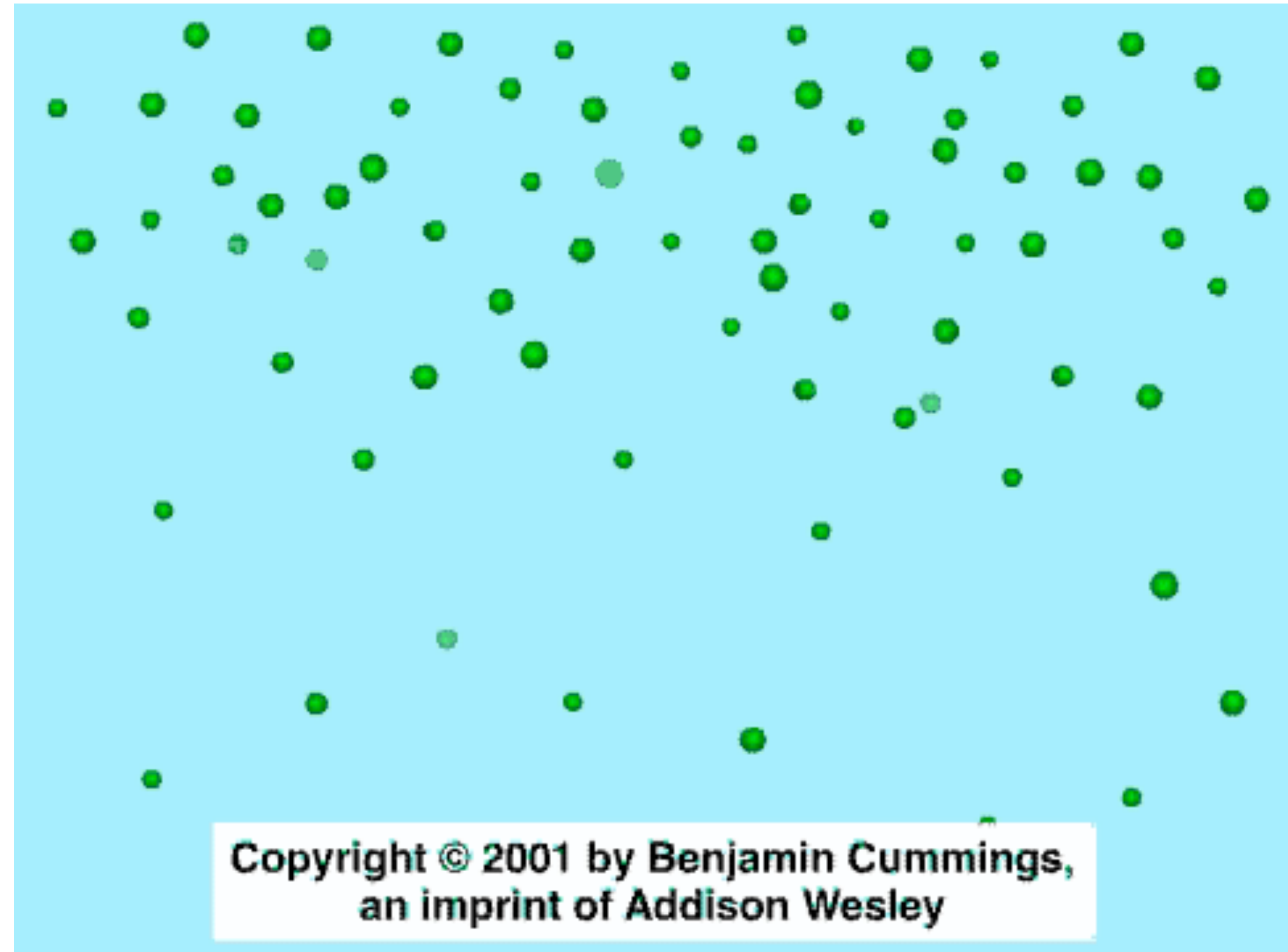




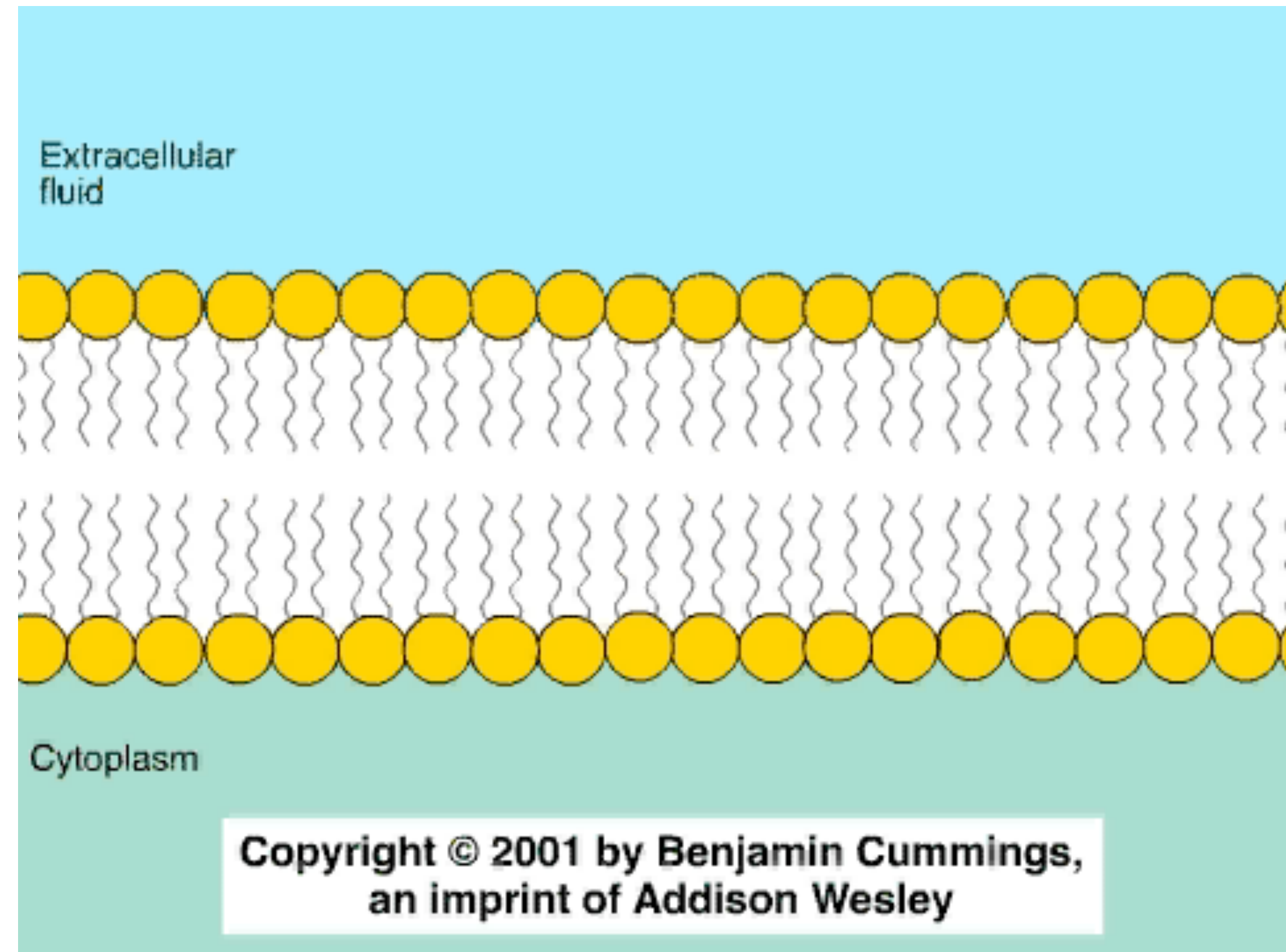
Oligosaccharide mailing label attached to proteins in the ER

Ummm, nice pictures 'art boy dude' but, what does a membrane transporter do?

# Diffusion

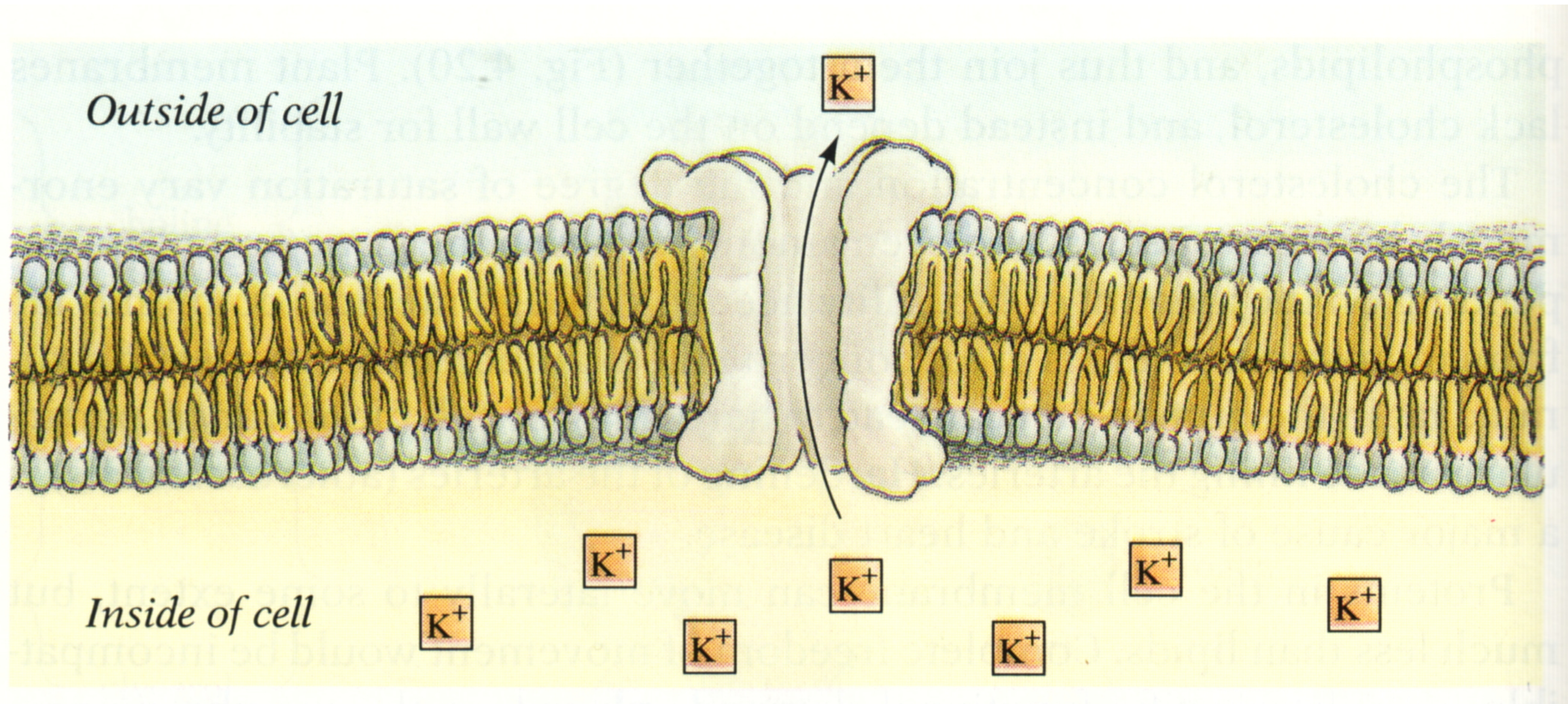


# Selectively Permeable



**So, what does a membrane transporter do?**

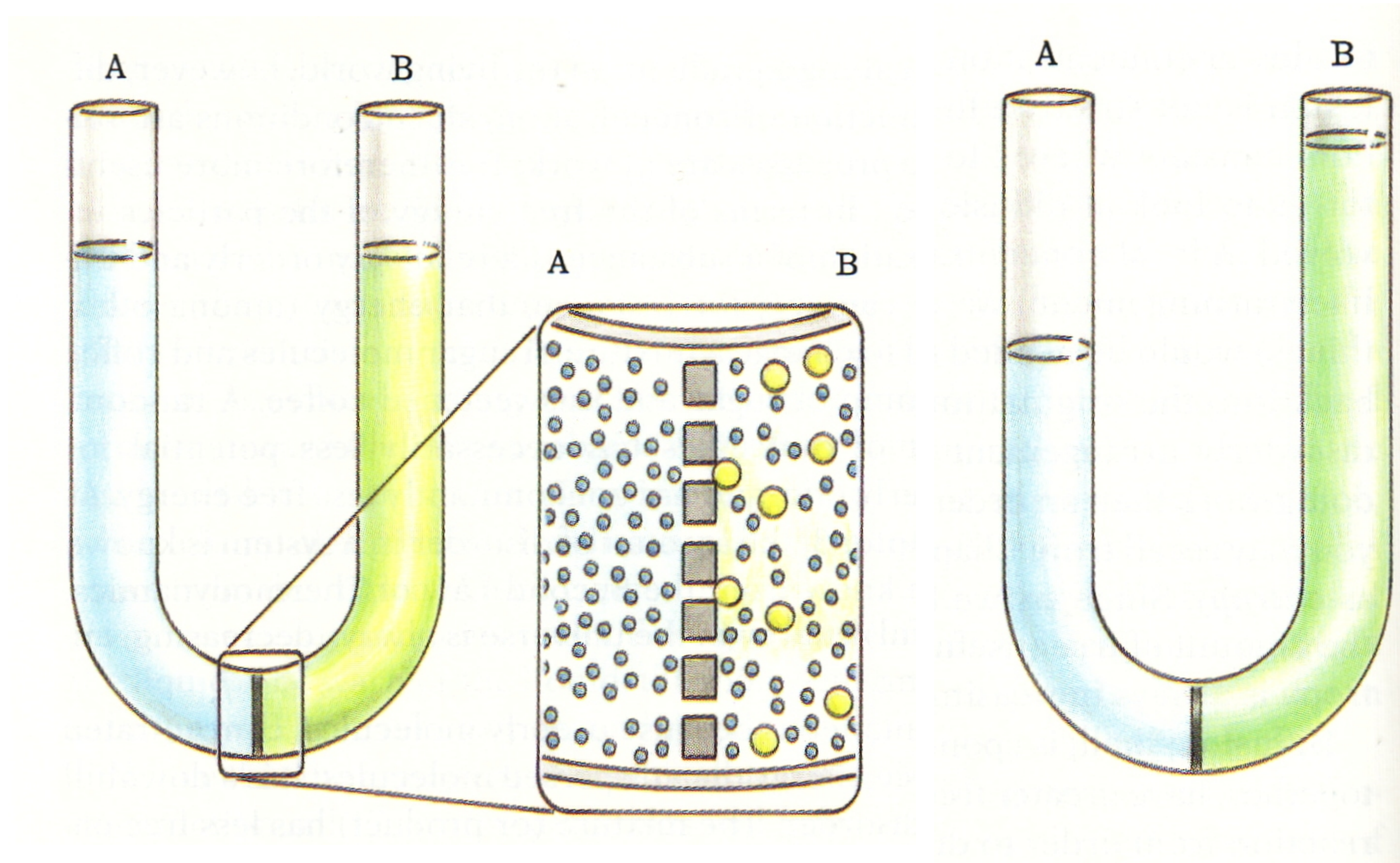
# Facilitated Diffusion



Water follows solute (salt)

*HEY!*

# Osmosis (diffusion of water)



(Preparing for) **Wednesday's lecture:**

**Budgeting homework time (30 min):** Section 5.3 of **Structure and Function of Plasma Membranes (OSB)** is 1532 words in length with four art figures (no data figures for trifactas). Reading at 200 words per minute would mean the section might take 8 minutes to read. If done properly, when you pause to review figures and take careful notes, this assignment should take you more like 30 minutes.

1. \_\_\_\_\_ **For Wednesday's lecture**, read section 5.3 "Active Transport" in the chapter **Structure and Function of Plasma Membranes (OSB)** (**1532 words**) and take handwritten notes in your notebook.
2. \_\_\_\_\_ While reading, be sure you can explain **Figures 1 and 3**. We will discuss these in class.
3. \_\_\_\_\_ **Advanced:** What is one way to determine whether ion movement is due to passive transport or active transport? Does this hold true for CFTR?

## 5.3 Active Transport

**Summary:** By the end of this section, you will be able to:

- Understand how electrochemical gradients affect ions
- Distinguish between primary active transport and secondary active transport

**active transport** mechanisms require the use of the cell's energy, usually in the form of adenosine triphosphate (ATP). If a substance must move into the cell against its concentration gradient—that is, if the concentration of the substance inside the cell is greater than its concentration in the extracellular fluid (and vice versa)—the cell must use energy to move the substance. Some active transport mechanisms move small-molecular weight materials, such as ions, through the membrane. Other mechanisms transport much larger molecules.

### Electrochemical Gradient

We have discussed simple concentration gradients—differential concentrations of a substance across a space or a membrane—but in living systems, gradients are more complex. Because ions move into and out of cells and because cells contain proteins that do not move across the membrane and are mostly negatively charged, there is also an electrical gradient, a difference of charge, across the plasma membrane. The interior of living cells is electrically negative with respect to the extracellular fluid in which they are bathed, and at the same time, cells have higher concentrations of potassium ( $K^+$ ) and lower concentrations of sodium ( $Na^+$ ) than does the extracellular fluid. So in a living cell, the concentration gradient of  $Na^+$  tends to drive it into the cell, and the electrical gradient of  $Na^+$

L.O.

- Understand how electrochemical gradients affect ions
- Distinguish between primary active + secondary active transport

Active Transport — require use of energy, usually ATP. If substance moves against its gradient must be..

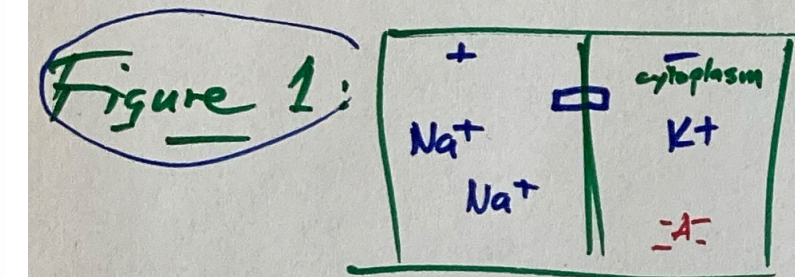
Previously discussed simple gradients of concentration but in life some things are charged. Cells (when alive) have negative charge inside and charged ions or molecules are attracted or repelled by charge.

So BOTH conc gradient + charge gradients are relevant. gradients too.

$Na, K$ -ATPase (pump) always running pushing  $3Na^+$  out of cell + pulling  $2K^+$  in

Electrochemical gradient:  $Na^+$  conc  $\xrightarrow{in}$  into cell  
elect  $\xrightarrow{in}$

$K^+$  conc  $\xrightarrow{out}$  into cell/out mixed  
elect  $\xleftarrow{in}$



Q: What is CFTR? H<sub>2</sub>s in Chloroplast

Moving against gradient (walking up river, against flow of water)  
active term = pump passive term = channel or carrier  
facilitated diffusion

metabolic poisons → ↓ ATP → problematic for all active processes (no electricity + sump pump)

1<sup>o</sup> active transport uses ATP + pumps against gradient

2<sup>o</sup> active transport uses existing gradients to move stuff against conc.

vocab for transporters: "uniporter" — carries one thing, "symporter" — two things same direction, "antiporter" — opposite directions

Figure 3: Attempt to show actions of  $Na/K^+$ -ATPase via drawings

Text explains each step with regard to which open orientation points

→ pump is electrogenic → generates electric current  $3^+ + 2^- \text{ net } 1^+$

↳ creates/source of life membrane potential

Figure 4

→  $Na+K$  gradient created by pump can be used to power carriers (H<sup>+</sup>, aa's, sugars)

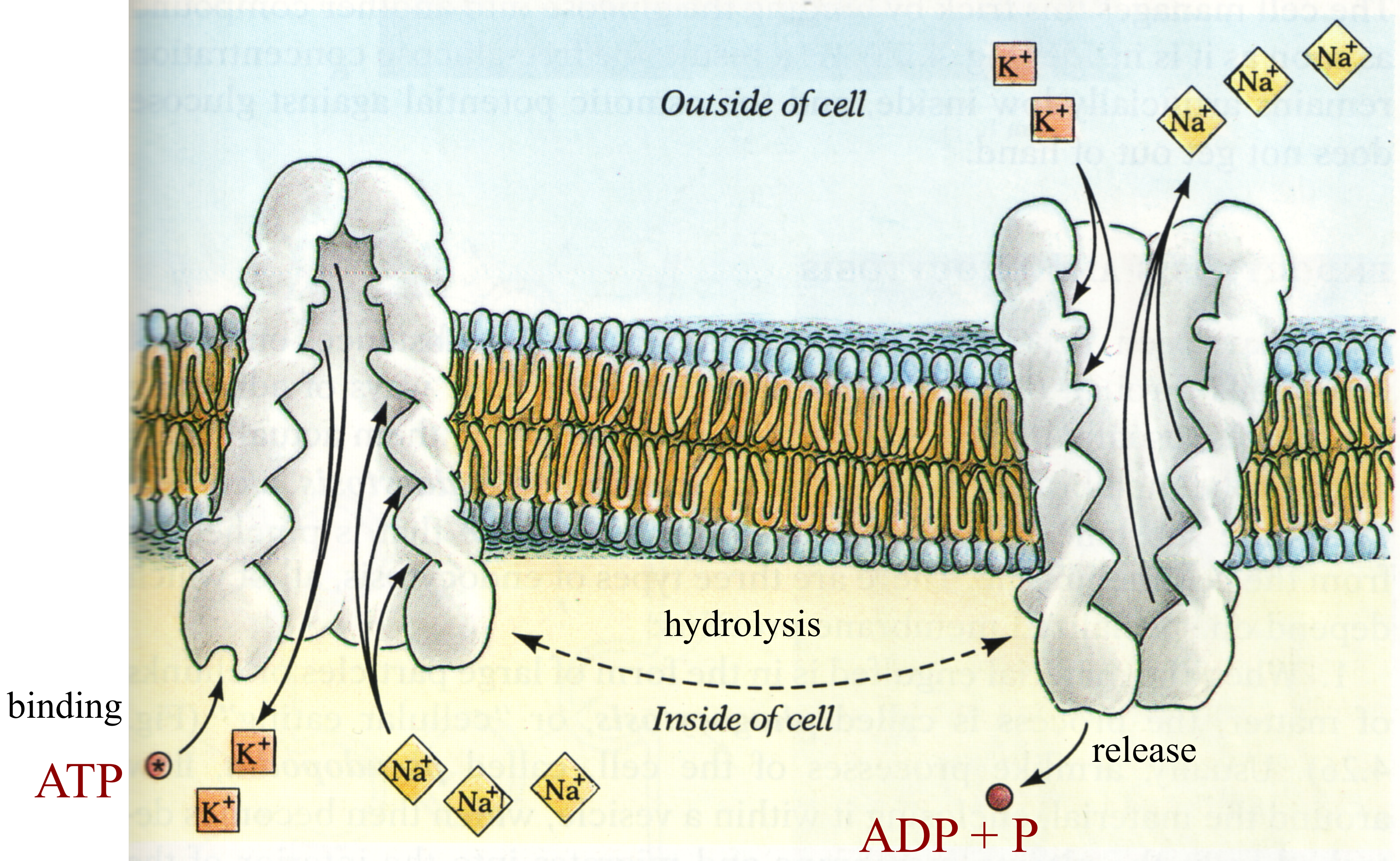
## 5.3 Active Transport

**Summary:** By the end of this section, you will be able to:

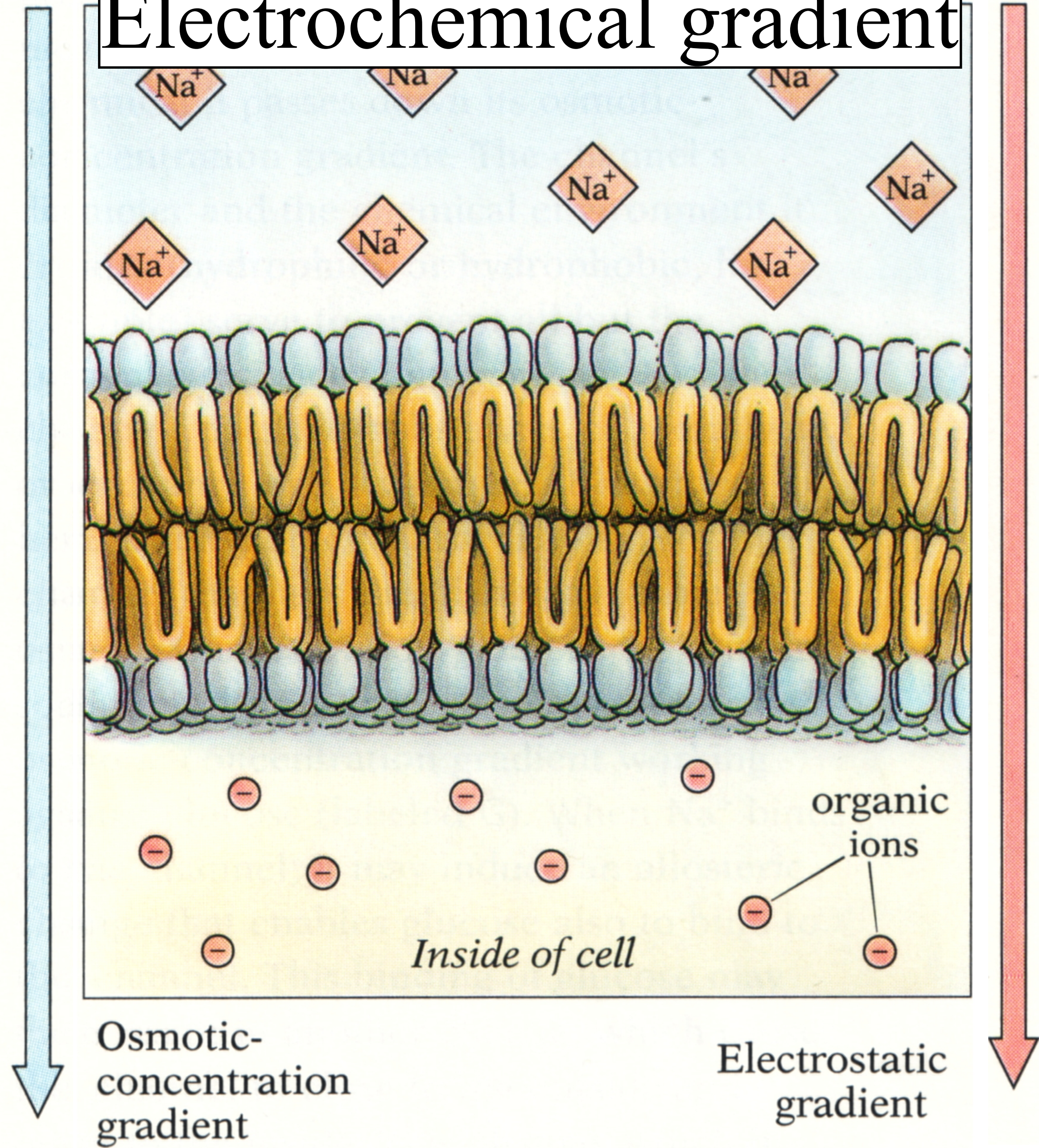
- Understand how electrochemical gradients affect ions
- Distinguish between primary active transport and secondary active transport

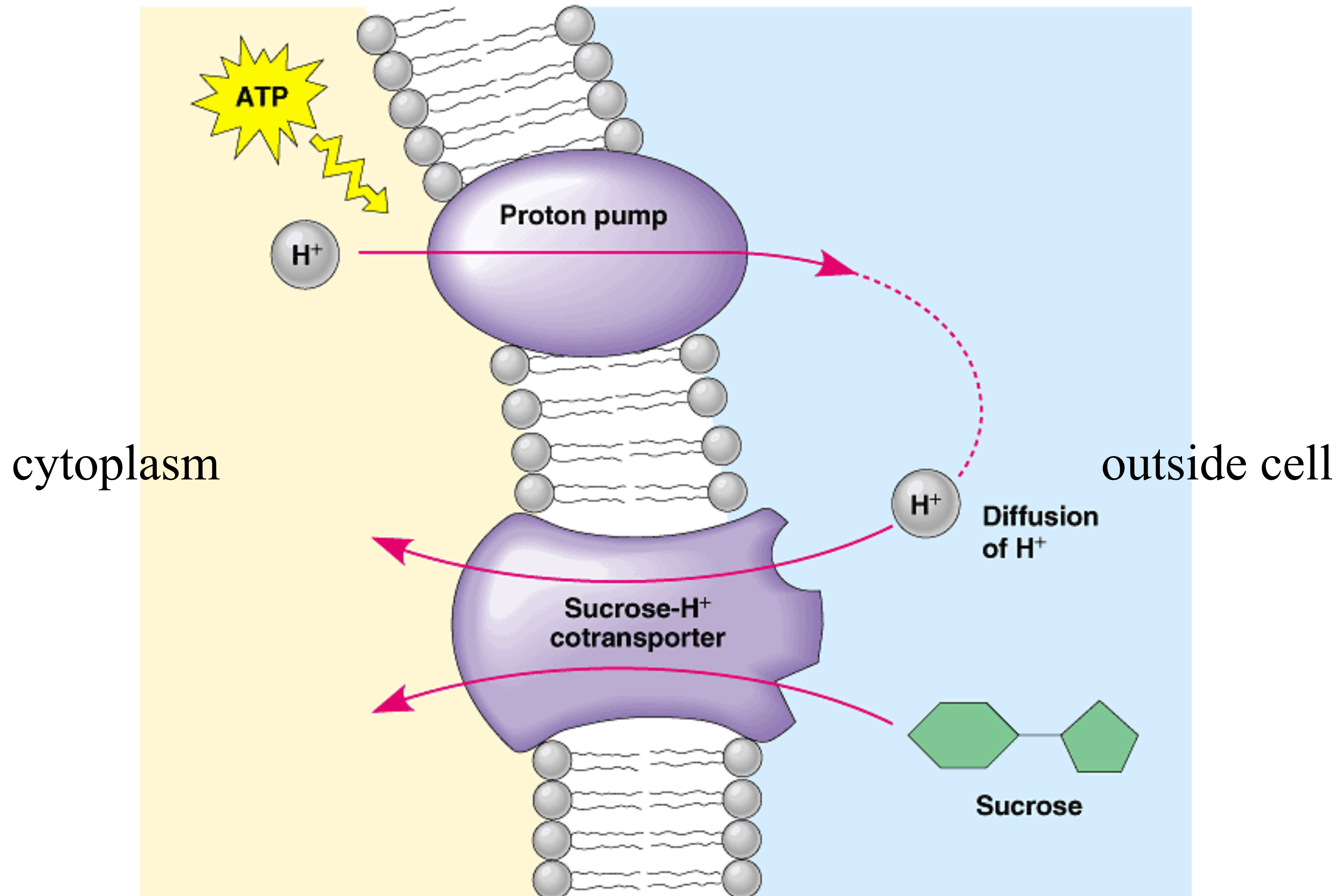
**active transport** mechanisms require the use of the cell's energy, usually in the form of adenosine triphosphate (ATP). If a substance must move into the cell against its concentration gradient—that is, if the concentration of the substance inside the cell is greater than its concentration in the extracellular fluid (and vice versa)—the cell must use energy to move the substance. Some transport mechanisms move small-molecular weight materials, such as ions, through the membrane. Other mechanisms transport much larger molecules.

# Active Transport



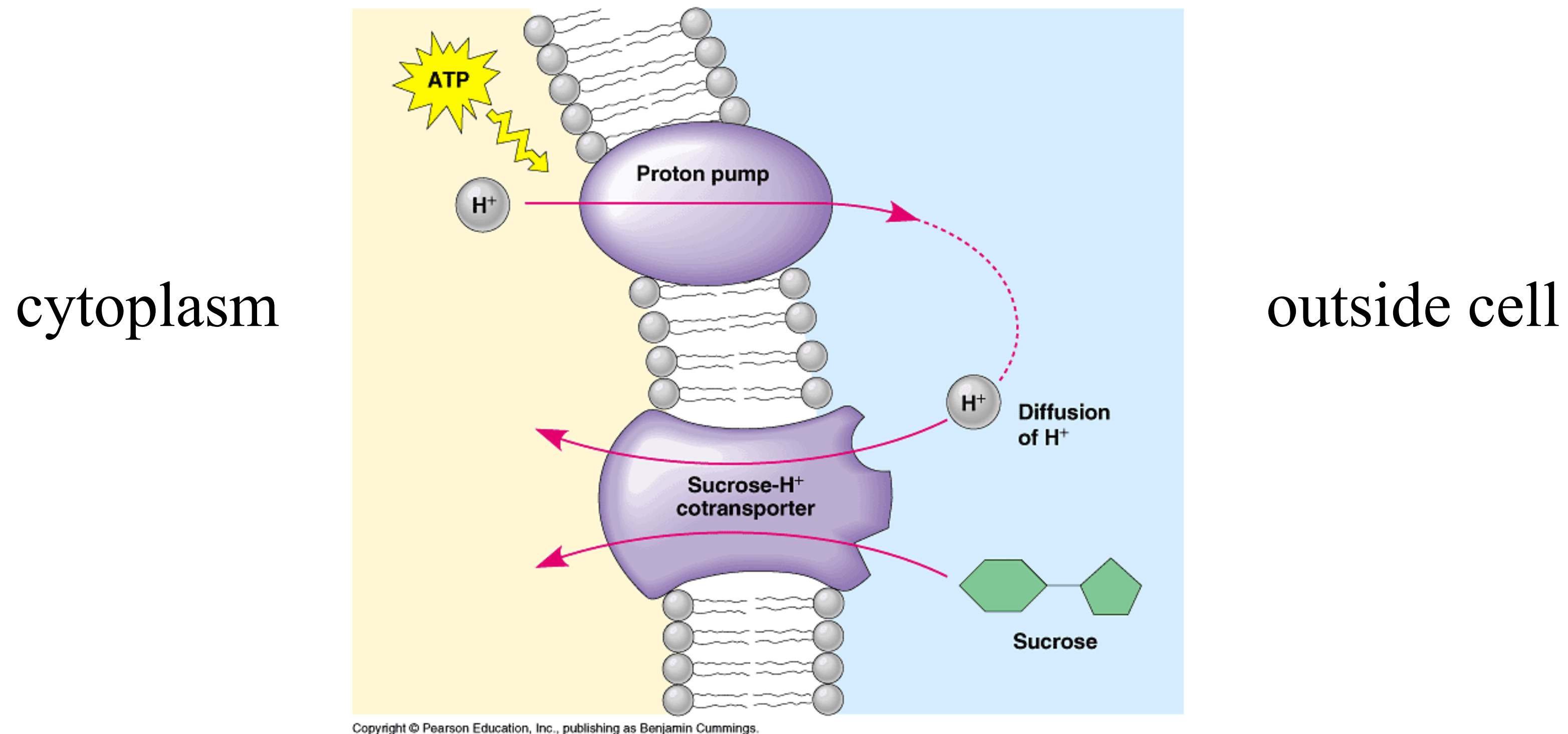
# Electrochemical gradient





**Which change would increase the rate of sucrose uptake into cell?**

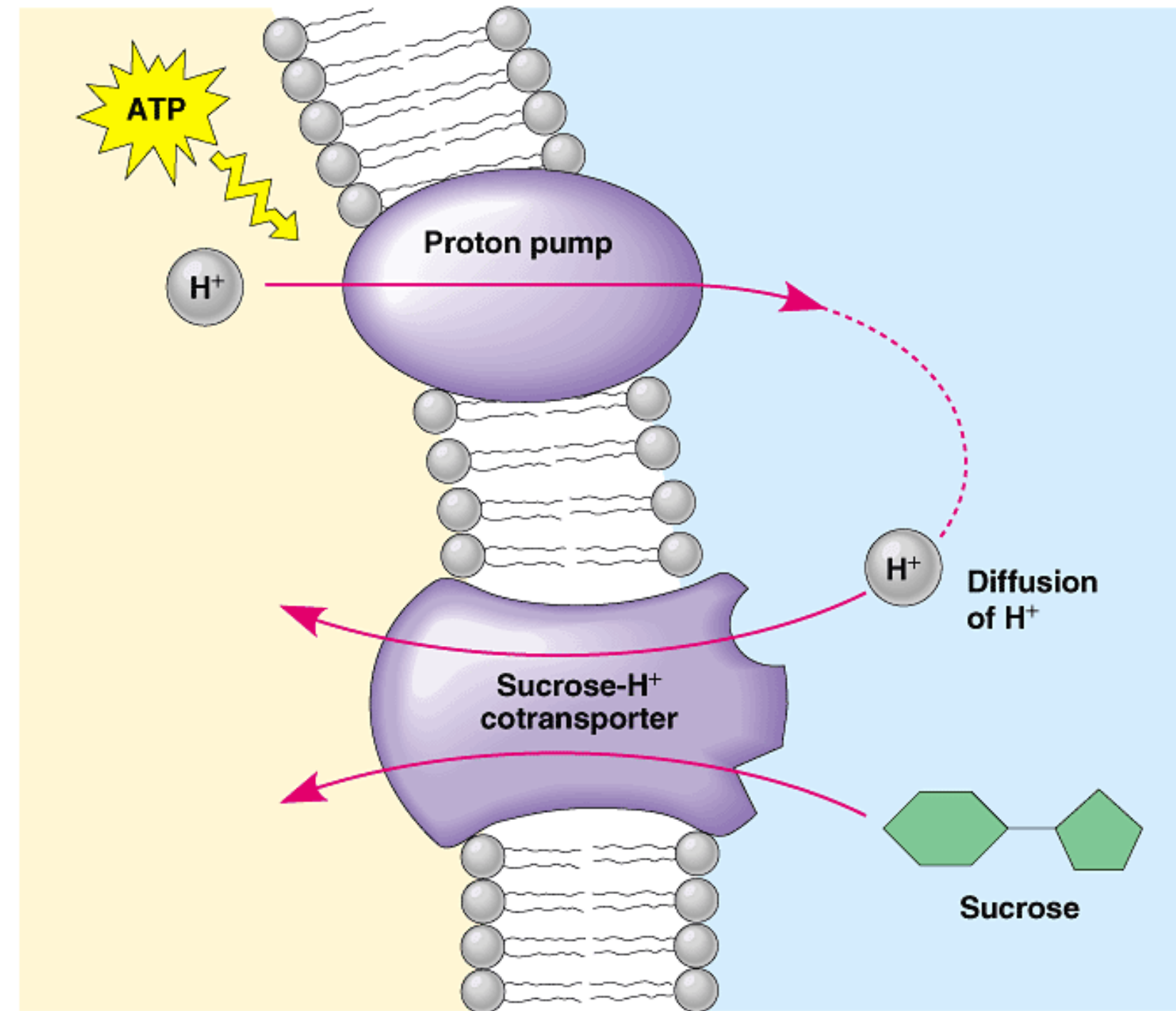
Alter: 1. [sucrose]? 2. [ATP]? 3. pH? (but on which side?)



**Based on the model of sucrose uptake shown, which of the following treatments would increase the rate of sucrose transport into the cell.**

- Decreasing extracellular sucrose concentration.
- Decreasing extracellular pH
- Decreasing cytoplasmic pH
- Adding an inhibitor that blocks the creation of ATP.
- Adding a substance that makes the membrane more permeable to H<sup>+</sup>

cytoplasm

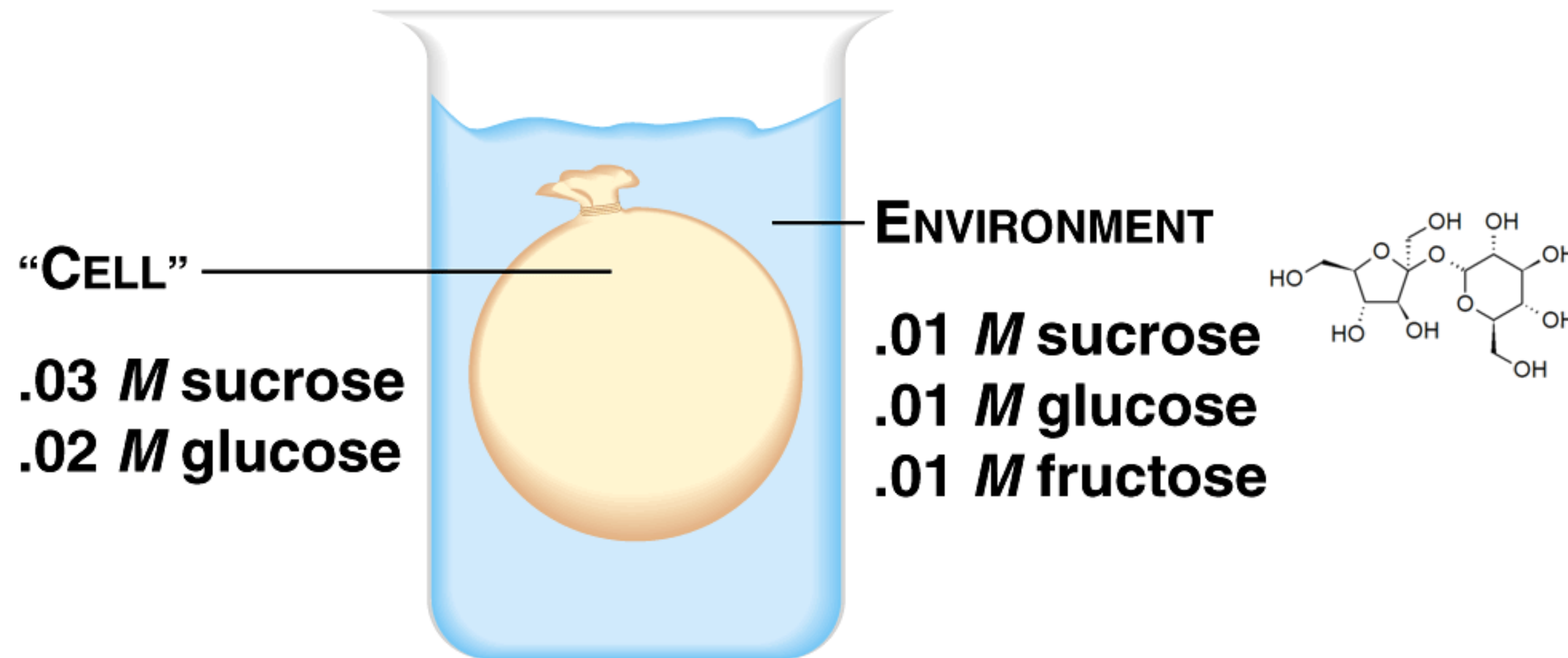


outside cell

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**Predict:** How would severely decreasing extracellular sucrose concentration alter extracellular pH?

An artificial cell with an aqueous solution enclosed in a selectively permeable membrane has just been immersed in this beaker.

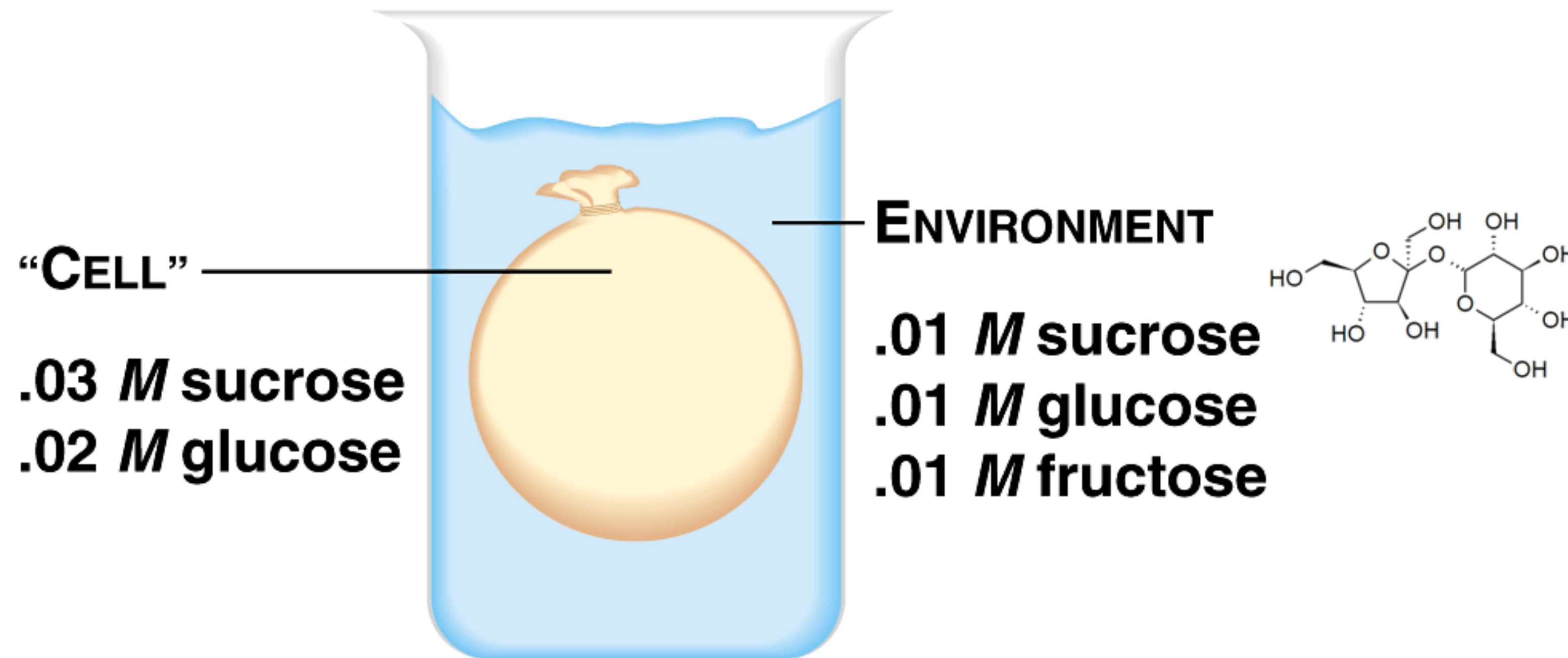


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If the membrane is permeable to water and monosaccharides...

1. Which solutes will diffuse into the cell?
2. In which direction will water move?
3. Is the cell's solution iso, hypo, or hypertonic to the beaker's?
4. Will the cell die?

An artificial cell with an aqueous solution enclosed in a selectively permeable membrane has just been immersed in this beaker.



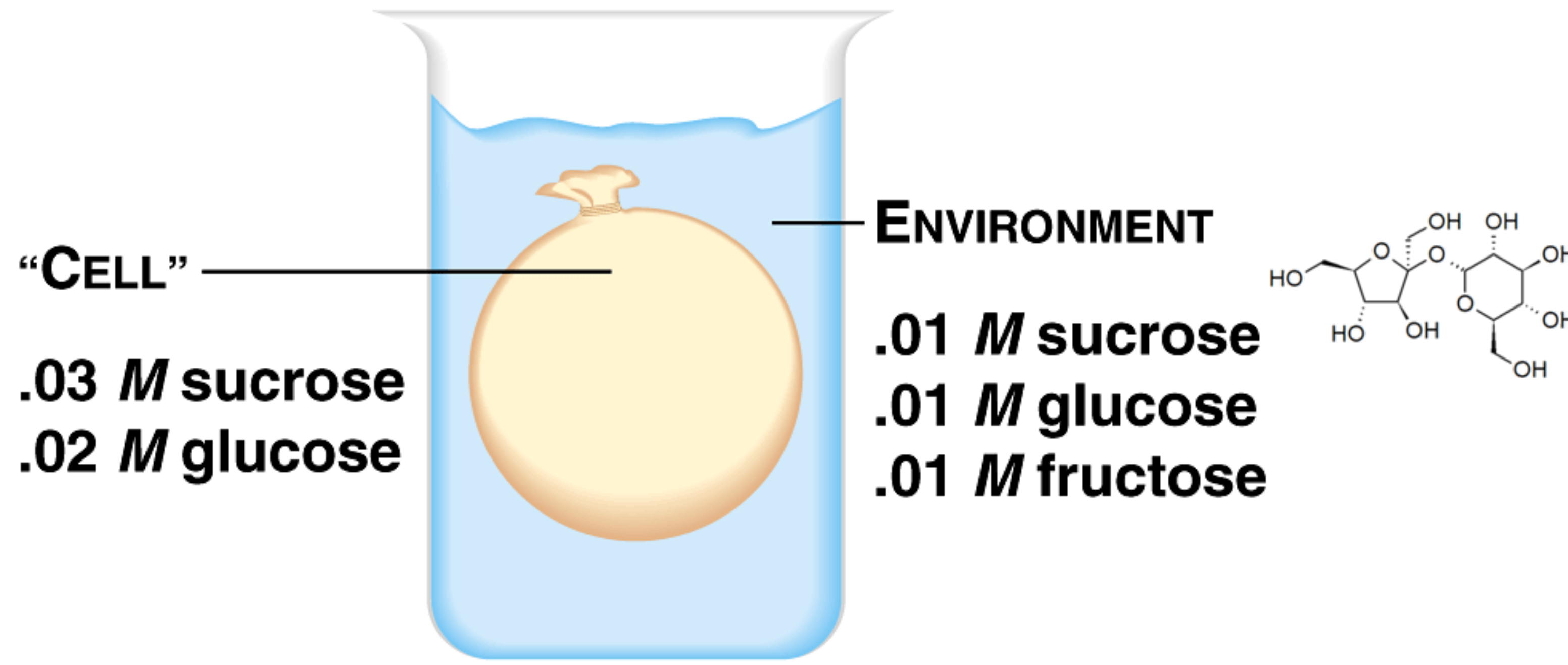
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If the membrane is permeable to water and monosaccharides...

1. Which solutes will diffuse into the cell?

- A. sucrose
- B. fructose
- C. glucose

An artificial cell with an aqueous solution enclosed in a selectively permeable membrane has just been immersed in this beaker.

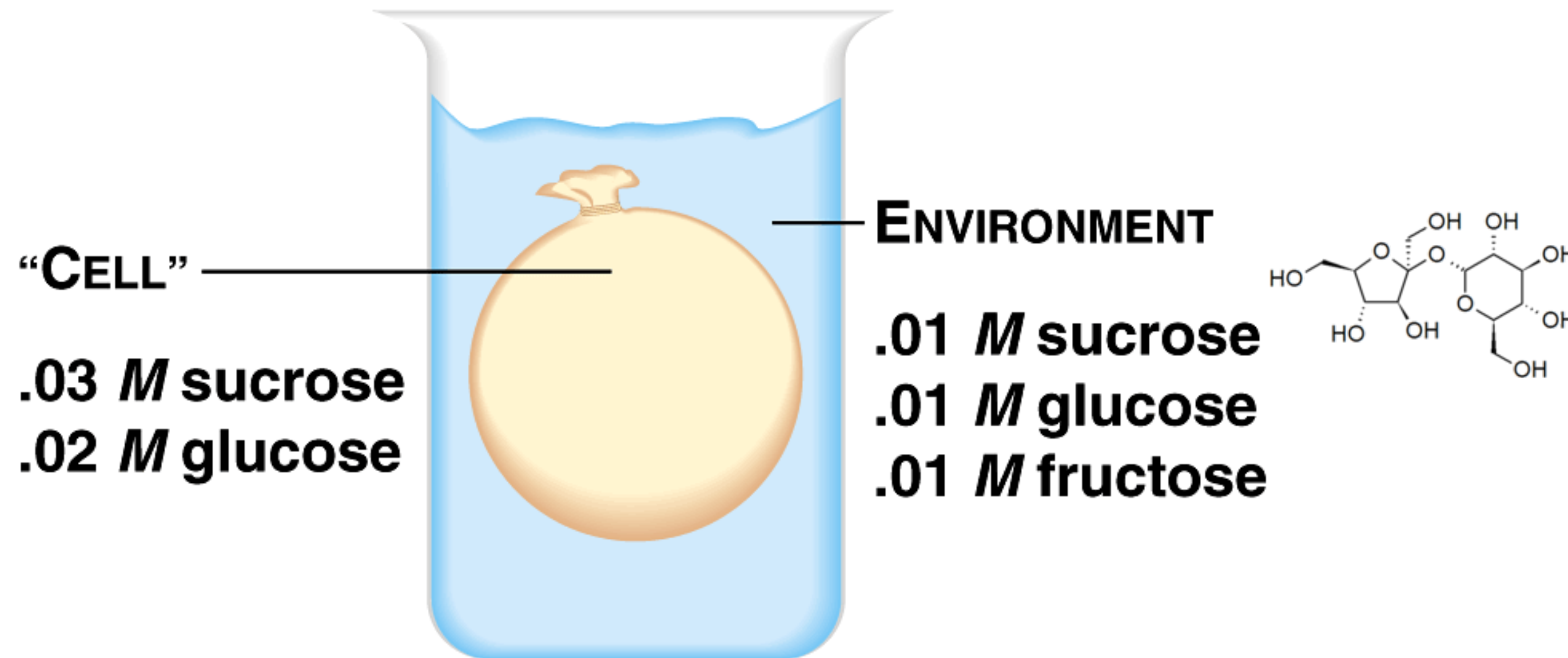


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If the membrane is permeable to water and monosaccharides...

2. In which direction will water move?
  - A. Into the cell causing it to swell up
  - B. Out of the cell causing it to shrink
  - C. Equally in both directions

An artificial cell with an aqueous solution enclosed in a selectively permeable membrane has just been immersed in this beaker.



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If the membrane is permeable to water and monosaccharides...

3. Is the cell's solution iso, hypo, or hypertonic to the beaker's?

- A. Isotonic
- B. Hypotonic
- C. Hypertonic

