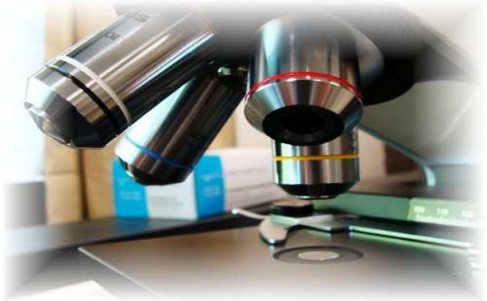

About Science Prof Online PowerPoint Resources

• Science Prof Online (SPO) is a free science education website that provides fully-developed Virtual Science Classrooms, science-related PowerPoints, articles and images. The site is designed to be a helpful resource for students, educators, and anyone interested in learning about science.

• The SPO Virtual Classrooms offer many educational resources, including practice test questions, review questions, lecture PowerPoints, video tutorials, sample assignments and course syllabi. New materials are continually being developed, so check back frequently, or follow us on Facebook (Science Prof Online) or Twitter (ScienceProfSPO) for updates.

• Many SPO PowerPoints are available in a variety of formats, such as fully editable PowerPoint files, as well as uneditable versions in smaller file sizes, such as PowerPoint Shows and Portable Document Format (.pdf), for ease of printing.

• Images used on this resource, and on the SPO website are, wherever possible, credited and linked to their source. Any words underlined and appearing in blue are links that can be clicked on for more information. PowerPoints must be viewed in *slide show mode* to use the hyperlinks directly.

• Several helpful links to fun and interactive learning tools are included throughout the PPT and on the Smart Links slide, near the end of each presentation. You must be in *slide show mode* to utilize hyperlinks and animations.

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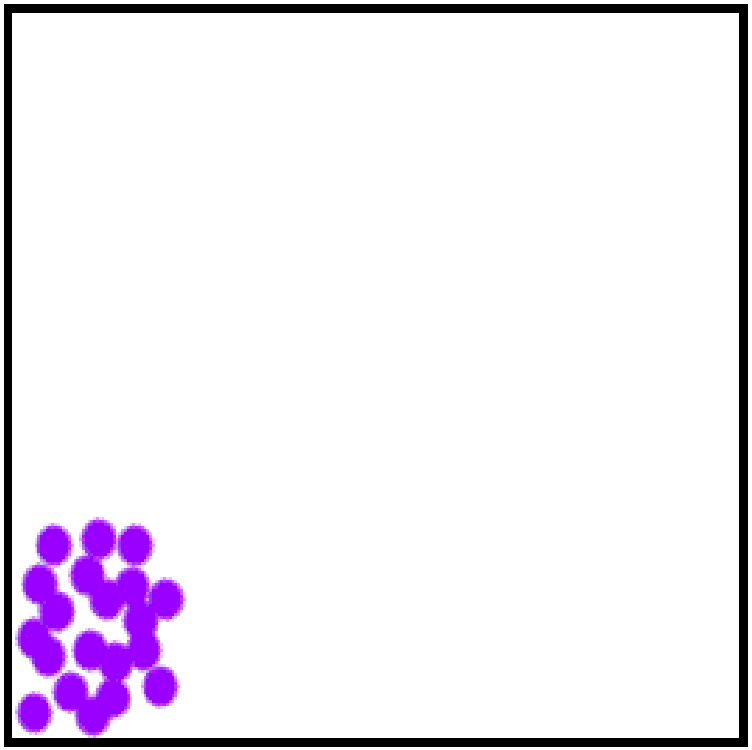
Image: Compound microscope objectives, T. Port

The Movement of Molecules:

Diffusion,

Osmosis &

Active Transport



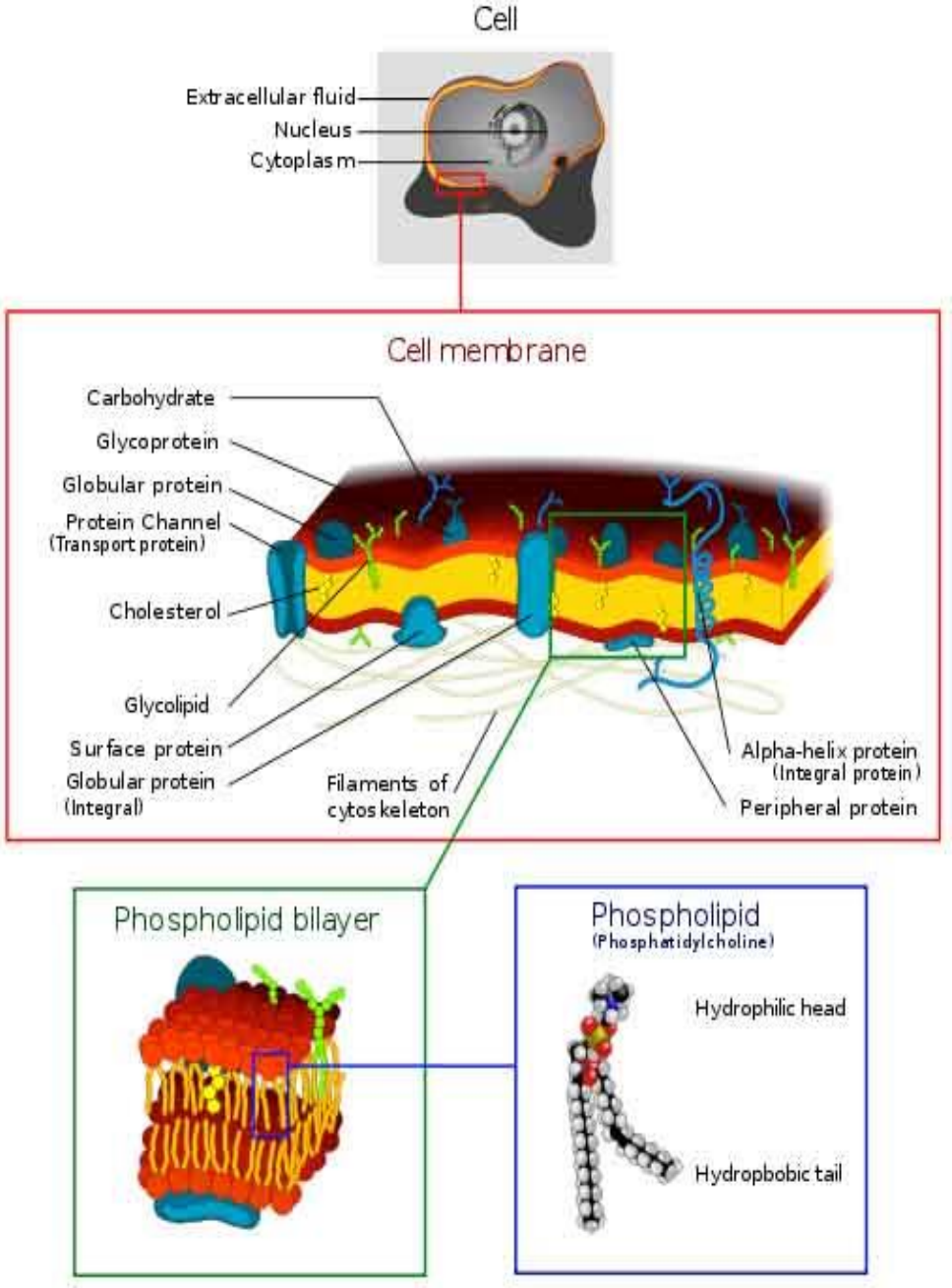
For additional resources on this lecture topic, see the Diffusion, Osmosis & Active Transport main page on SPO.

Images: Diffusion Animation, Biology Corner; Diffusion, J Krieger

Prokaryotes

Plasma Membrane

- Separates the cell from its environment.
- Phospholipid molecules oriented so that **hydrophilic water-loving** heads directed outward and **hydrophobic water-hating** tails directed inward.
- Proteins embedded in two layers of lipids (lipid bilayer).
- Membrane is **semi-permeable**.
  Q: What does that mean?



From the Virtual Cell Biology Classroom on ScienceProfOnline.com

Image: Cell Membrane diagram, Dhatfield

Passive Transport

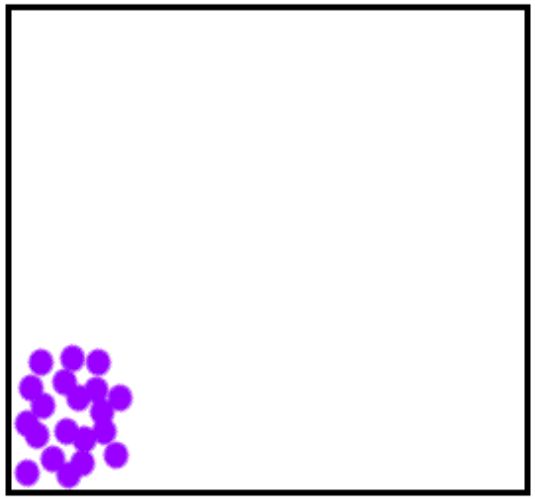
Primary function of plasma membrane → regulate movement of molecules entering or leaving cell.

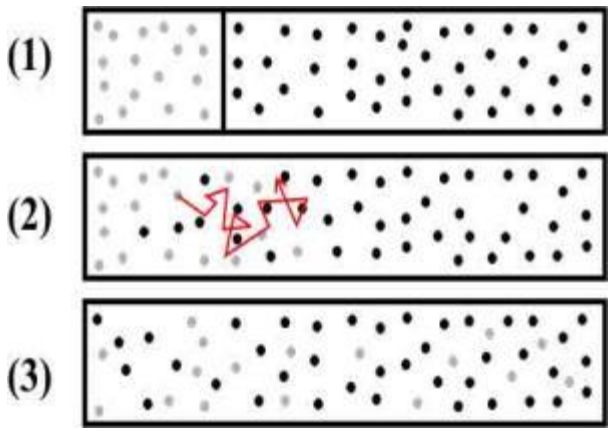
Movement of molecules across plasma membrane requires energy.

Movement of molecules is passive if no energy sources of the ***cell*** are expended.

Diffusion = when molecules move down a concentration gradient, from a higher to a lower concentration.

Q: What type of things might affect the rate of diffusion?





Images: Diffusion Animation, Biology Corner; Diffusion, J Krieger

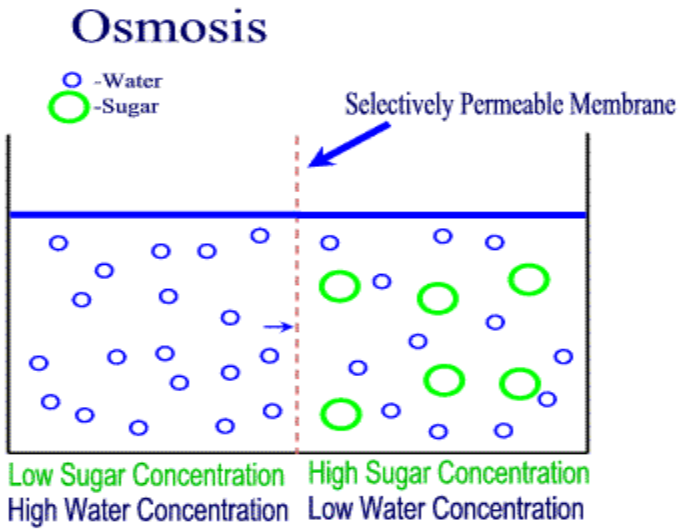
Passive Transport - Osmosis

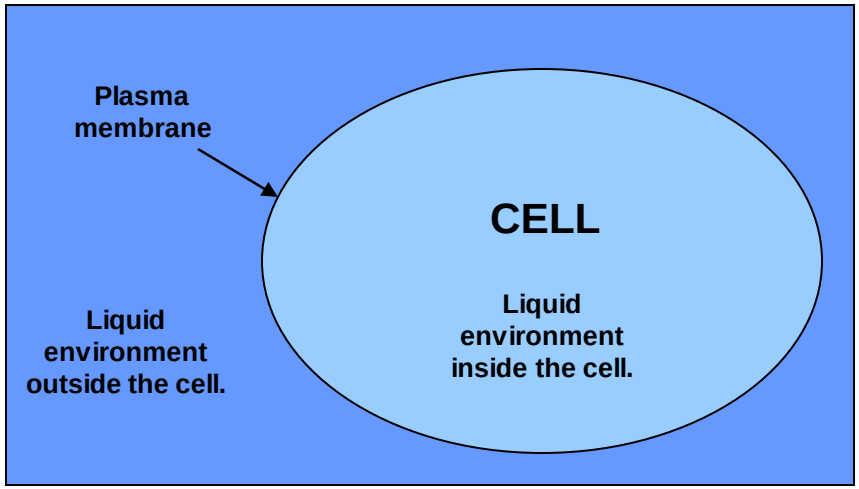
Q: Diffusion of **what** across the plasma membrane?

Environment surrounding cells may contain amounts of dissolved substances (solutes) that are…

- *equal to*
- *less than*
- *greater than*

…those found within the cell.





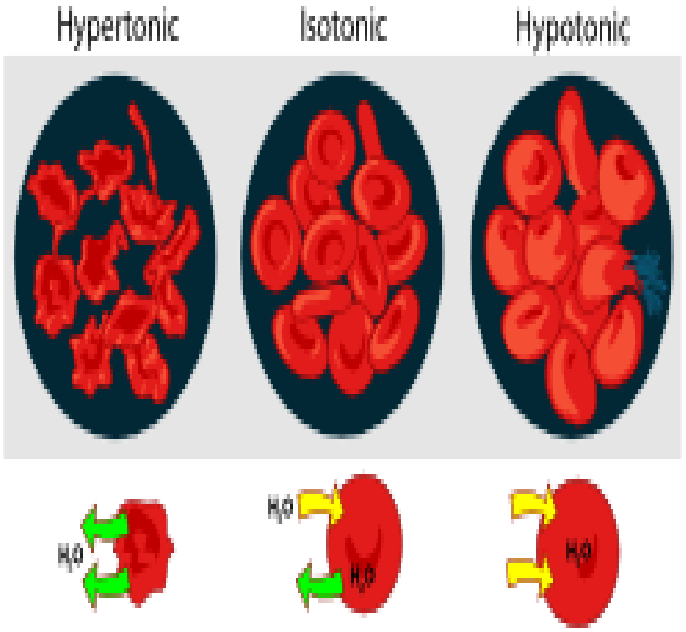
Images: Osmosis animation

Passive Transport - Osmosis

Tonicity and Osmosis

- **isotonic**: equal concentration of a solute inside and outside of cell.
- **hypertonic**: a higher concentration of solute.
- **hypotonic**: a lower concentration of solute.

Water will always move toward a hypertonic environment!!



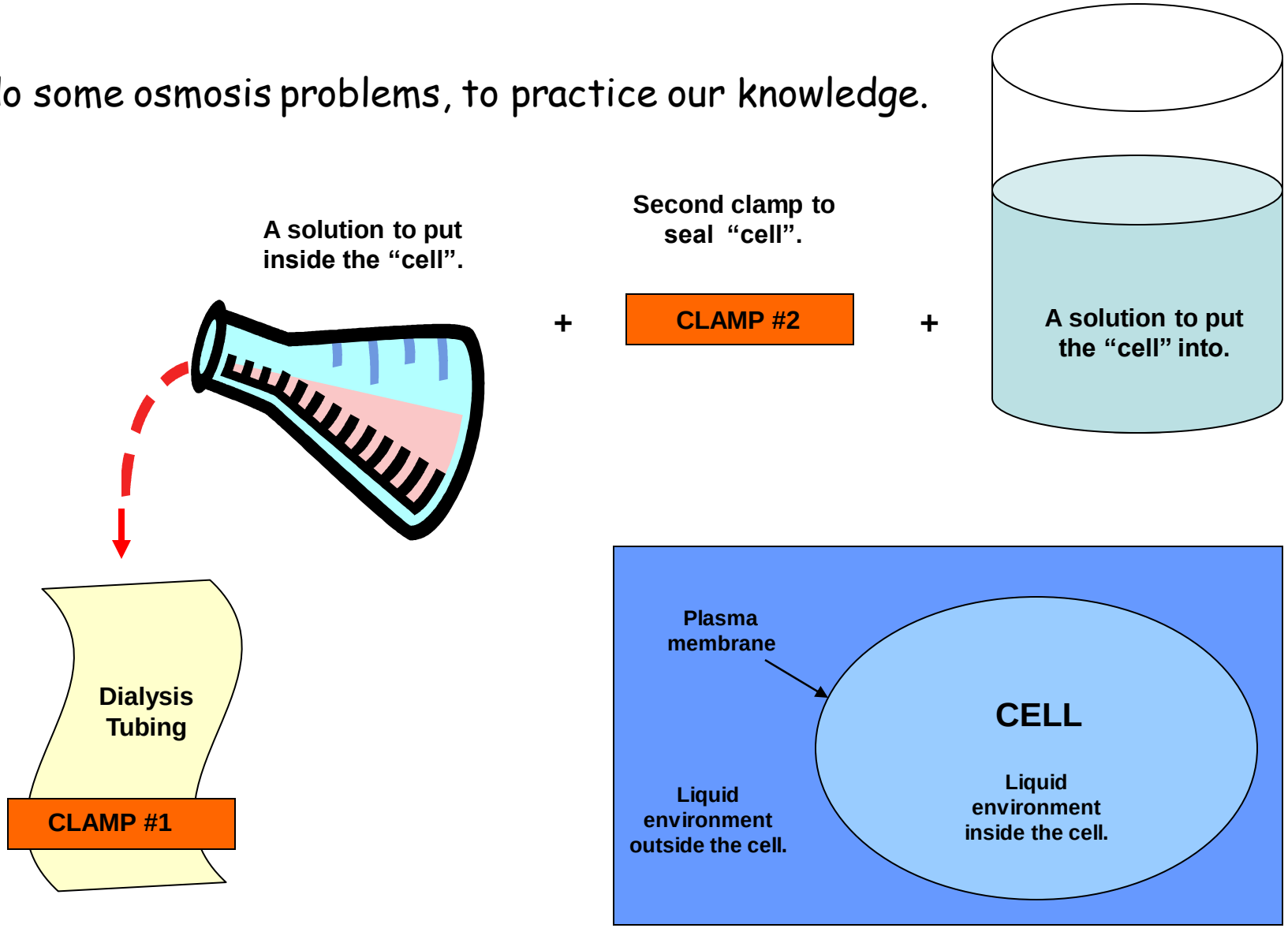
REVIEW!

- How Osmosis Works animation
- Diffusion, Osmosis & Active Transport Lecture Main Page of the Virtual Cell Biology Classroom on the Science Prof Online website

Images: Osmosis animation; Osmosis with RBCs, M. Ruiz

Passive Transport - Osmosis

Let's do some osmosis problems, to practice our knowledge.



Passive Transport

Facilitated Diffusion

Proteins assist in diffusion of molecules across plasma membrane.

Movement only occurs in the presence of a concentration gradient.

Some molecules move across the membrane more quickly if diffusion is facilitated by a carrier molecule.

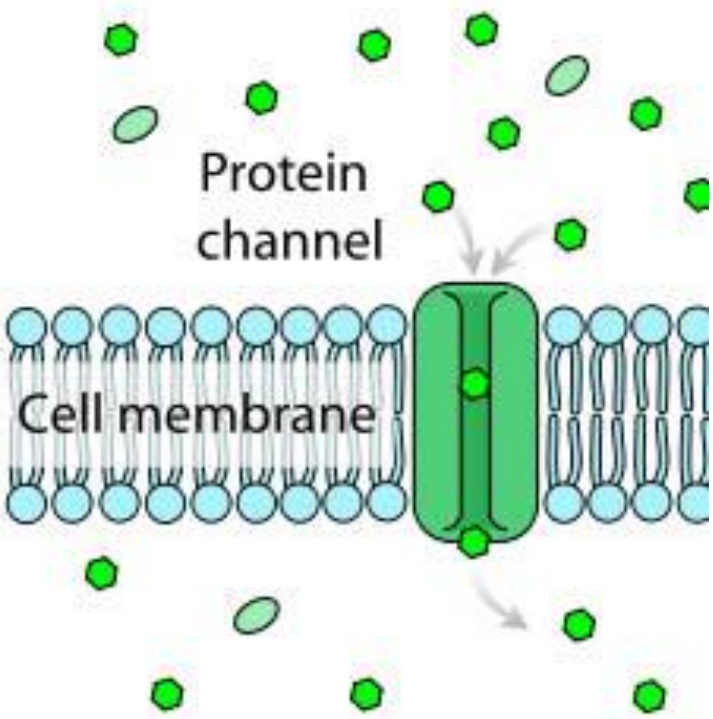
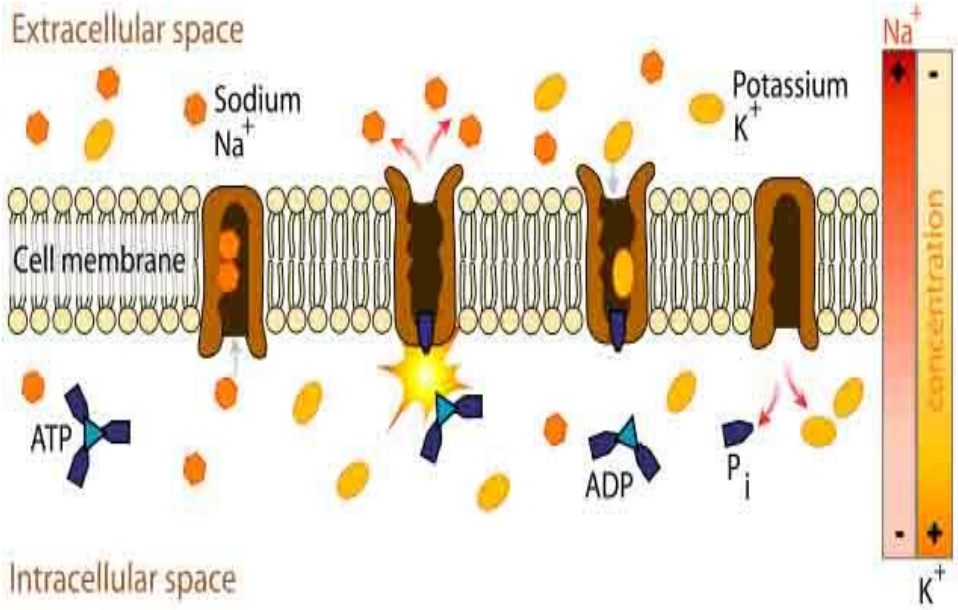


Image: Facilitated Diffusion, M. Ruiz

Active Transport

- How most molecules move across the plasma membrane.
- Analogous to a pump moving water uphill.
- Types of active transport are classified by type of energy used to drive molecules across membranes.



ATP Driven Active Transport

Energy from adenosine triphosphate (ATP) drives substances across the plasma membrane with aid of carrier molecules.

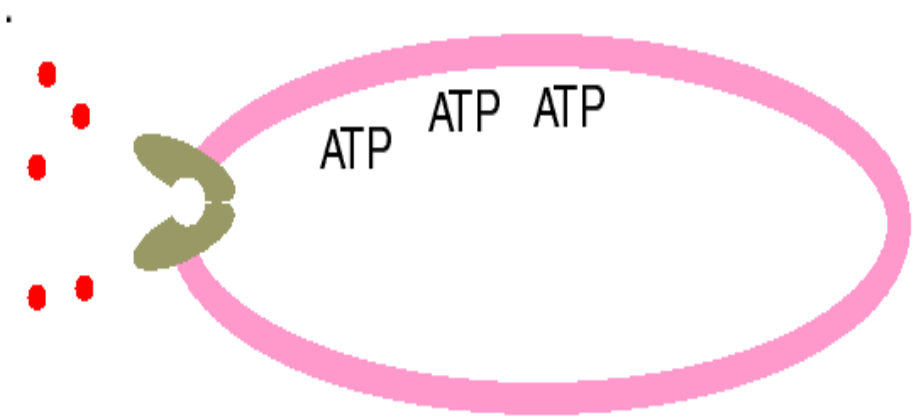


Image: Sodium-potassium pump, M. Ruiz

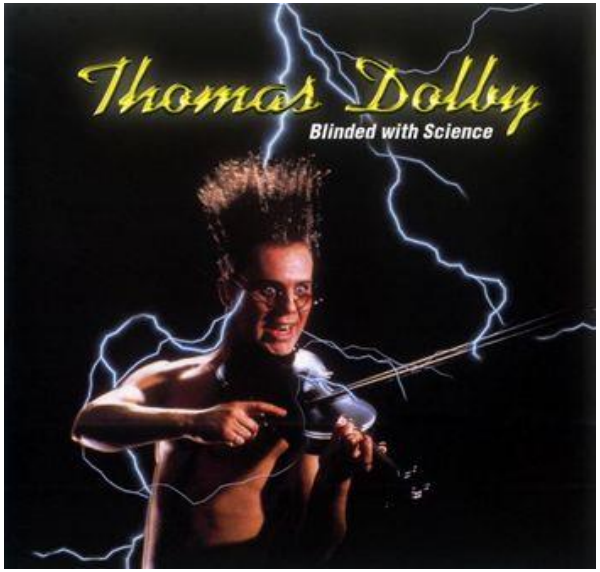
Confused?

Here are some links to fun resources that further explain Cell Biology:

Smart Links

- Diffusion, Osmosis & Active Transport Main Page, Virtual Cell Biology Classroom of Science Prof Online website.
- "The Osmosis Song" music video by Duanie Films.
- Osmosis Demonstration with raw egg by thsharpe.
- "Osmosis Jones" movie trailer. If you haven't seen this yet, you must watch it immediately! It's awesome!
- Osmosis Animation and Quiz by McGraw-Hill.
- Active Transport Animation and Quiz Sodium Potassium Pump, by McGraw-Hill.
- Diffusion Animation and Quiz by McGraw-Hill.
- Facilitated Diffusion Animation and Quiz by McGraw-Hill.

(You must be in PPT slideshow view to click on links.)



Are you feeling blinded by science?

Do yourself a favor. Use the…

Virtual Cell Biology Classroom *(VCBC)*!

The VCBC is full of resources to help you succeed, including:

- practice test questions
- review questions
- study guides and learning objectives
- PowerPoints on other topics

You can access the VCBC by going to the Science Prof Online website
www.ScienceProfOnline.com

Images: Blinded With Science album, Thomas Dolby; Endomembrane system, Mariana Ruiz, Wiki