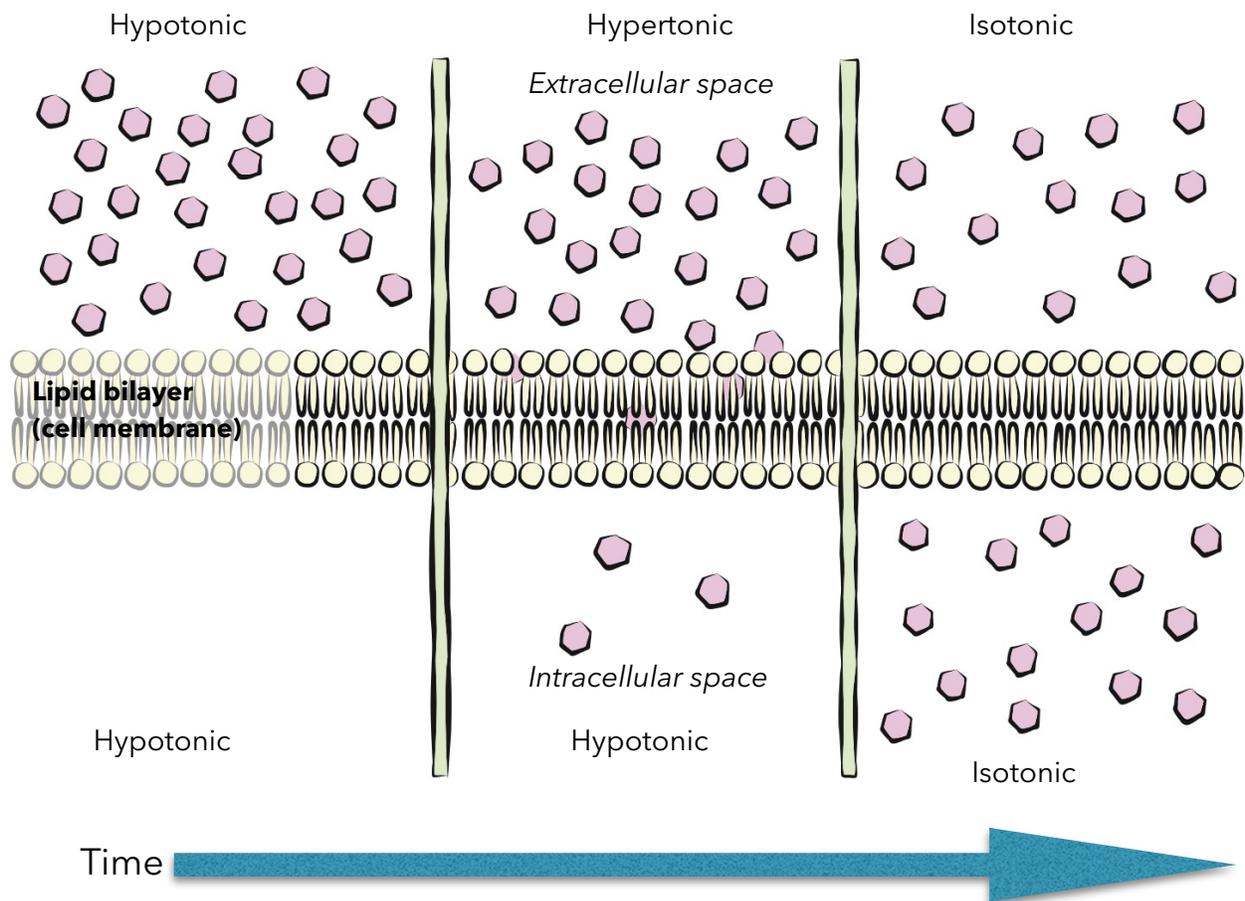


Egg Lab

- I. *Purpose...* Understand the principles of diffusion.
- II. *Research...* Passive Transport Diffusion (graphics, description, how it works [law])



Passive transport is a means of transportation in which ions or molecules travel along the concentration gradient. Passive transportation works effortlessly or it does not demand chemical energy. This is the result of diffusion; diffusion and concentration gradient are alike, both seek a balance throughout space by moving from an area of *high* concentration to *low* concentration. In the diagram above, this is why we have hypertonic (high concentration of substance), hypotonic (low concentration of substance) and isotonic (concentration is balanced between both sides of the cell membrane).

III. *Materials:*

- Egg
- Vinegar
- Beaker
- Corn syrup
- Photo cube
- iPad

IV. *Procedures:*

A. Set Up I

1. Egg in beaker
2. Cover egg with vinegar
3. Observations
4. Twice daily

B. Experimentation

1. Two photos (early morning and late morning)
2. Observations
3. Twice daily

C. Set Up II

1. Pour out vinegar
2. Cover egg with corn syrup
3. Observe daily

V. Data

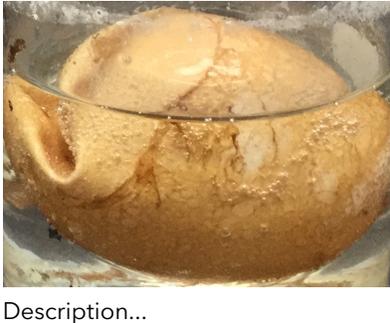
Egg in Vinegar

Time	Early Morning	Late Morning
Day 1	 <p data-bbox="613 821 1003 915">Description... Egg covered in bubbles and seemed magnified.</p>	 <p data-bbox="1026 806 1421 905">Description... Egg floated to the surface of the beaker with more bubbles.</p>
Day 2	 <p data-bbox="613 1257 1003 1352">Description... Egg rolls in beaker and egg looks lighter in shade.</p>	 <p data-bbox="1026 1270 1421 1365">Description... Egg rolls more, no significant difference.</p>
Day 3	 <p data-bbox="613 1711 1003 1806">Description... Beaker had foam residue left over, vinegar less in amount.</p>	 <p data-bbox="1026 1740 1421 1835">Description... Egg expanded in beaker, vinegar moved to the bottom.</p>

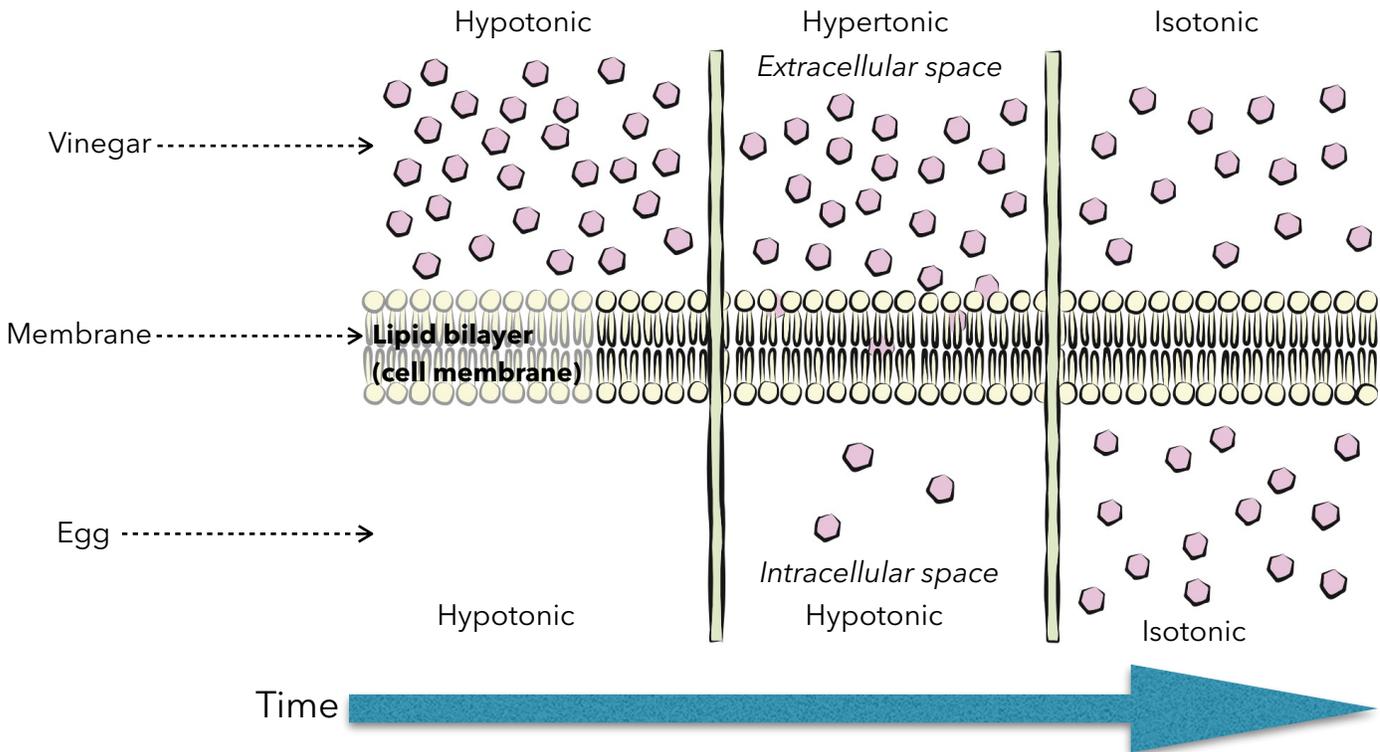
Time	Early Morning	Late Morning
Day 4	 <p data-bbox="613 646 974 705">Description... Egg has absorbed more vinegar.</p>	<p data-bbox="1027 443 1230 470">Photo unavailable.</p> <p data-bbox="1027 506 1406 600">Description... There was no significant difference in the egg.</p>
Day 5	 <p data-bbox="613 1081 995 1176">Description... More of the vinegar was absorbed, egg does not float as much.</p>	<p data-bbox="1027 940 1393 968">Egg in Vinegar observations over.</p>

Egg in Corn Syrup

Time	Early Morning	Late Morning
Day 1	 <p data-bbox="613 1766 974 1860">Description... The egg is now drenched in corn syrup.</p>	 <p data-bbox="1027 1787 1409 1881">Description... The egg is floating to the top of the corn syrup.</p>

Time	Early Morning	Late Morning
Day 2	 <p data-bbox="613 604 1003 697">Description... The egg has sunk into the corn syrup.</p>	 <p data-bbox="1026 604 1416 697">Description... The corn syrup is less dense.</p>
Day 3	 <p data-bbox="613 1033 1003 1150">Description... The egg has gone further down the beaker and has a very noticeable dent in it.</p>	 <p data-bbox="1026 1033 1416 1150">Description... The dent in the egg has gotten larger.</p>
Day 4	 <p data-bbox="613 1503 1003 1558">Description... No noticeable changes.</p>	 <p data-bbox="1026 1503 1416 1558">Description... End of Egg Lab and no noticeable changes.</p>

A. Egg in Vinegar



1. Bubbles?

The bubbles are carbon dioxide (CO_2). Vinegar consists of a chemical called acetic acid (CH_3COOH). Eggshells are made up of calcium carbonate (CaCO_3). The acetic acid in the vinegar reacts with the calcium carbonate in the eggshell to make calcium acetate, thus making the bubbles!

2. Floating?

The egg floats in vinegar due to the bubbles that cover the egg. Since the vinegar is more dense than other substances like water the egg floats, whereas in water, the egg would just sink to the bottom.

3. Rotating?

The egg, or my egg rotated because of the reaction to the acetic acid. You see, the bubbles were released all around the egg, however, they were not distributed evenly around the egg. Nature is always trying to find a balance... so the the bubbles would constantly rise to the surface or to the bottom of the egg, making the egg rotate.

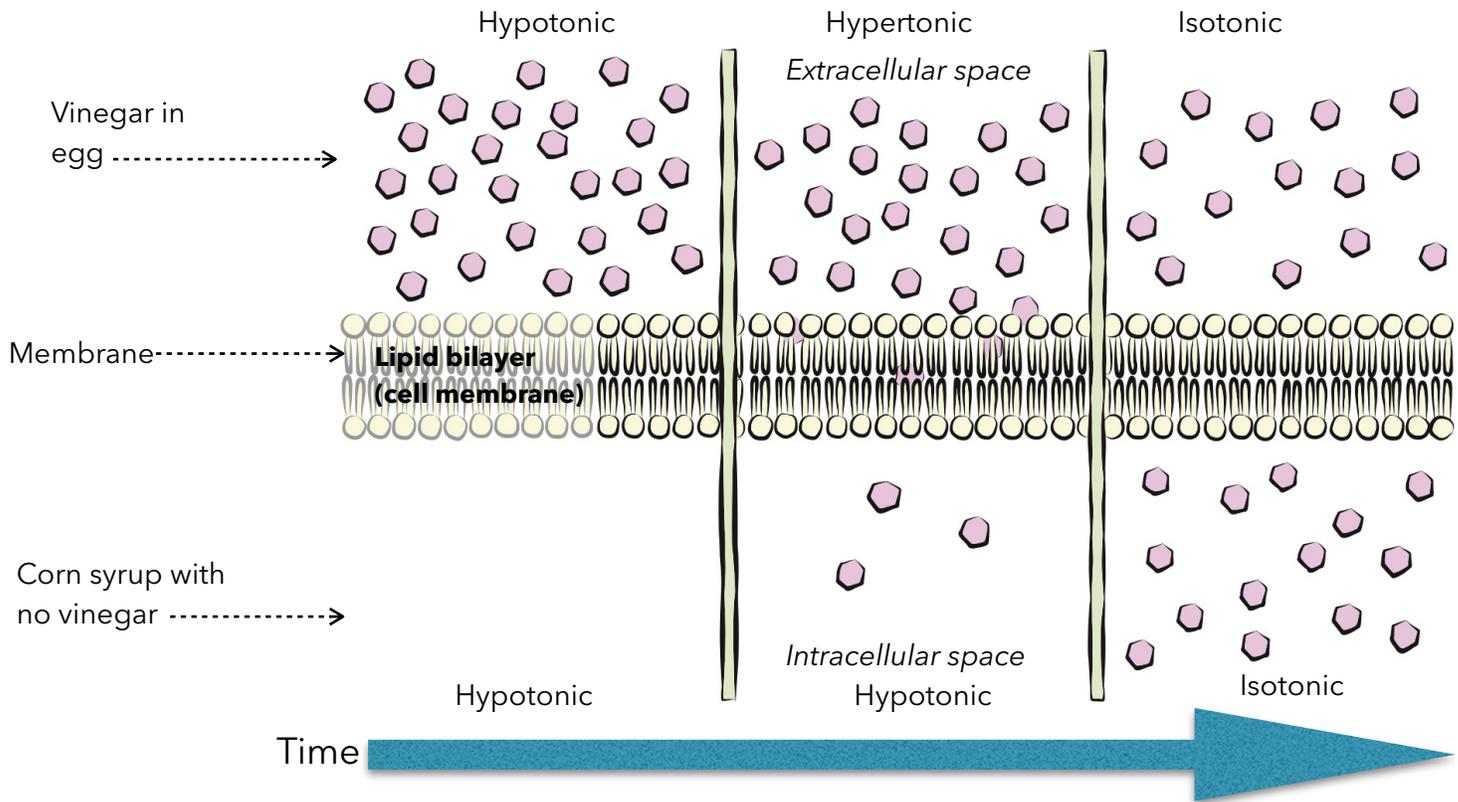
4. Foam residue?

The foamy residue around the beaker is the outcome of the shell dissolving. Once the vinegar in the egg breaks the eggshell into pieces... that is what then makes the foamy residue.

5. Less vinegar?

The egg membrane absorbed the vinegar by osmosis (the process of molecules in a solvent that passes through a semipermeable membrane from a less concentrated solution to a more concentrated solution) The vinegar molecules are small enough to go through the egg membrane making a hypotonic solution. Essentially, diffusion occurs until both sides are isotonic.

B. Egg in Corn Syrup



1. Deflating?

Since the corn syrup's molecules are larger in mass than vinegar, the corn syrup does not enter the egg membrane but the vinegar inside the egg leaves and is now in the corn syrup solution.

2. Viscosity?

Some of the vinegar entered the egg and corn syrup, this manipulated the viscosity, or density of the thickness, of the solution it was placed in. The corn syrup became thinner because the water (H₂O) that came from the egg was going into a hypotonic solution. The corn syrup did not pass through the membrane but the vinegar did... which then creates the hypertonic solution.

References

Nave R. *Osmosis*. (N.d.). Retrieved from <http://hyperphysics.phy-astr.gsu.edu/hbase/Kinetic/diffus.html#c3>

Spangler, S. "Naked Eggs." *The Lab*. N.p., (2015). Web. 10 Feb. 2017. <http://www.stevespanglerscience.com/lab/experiments/naked-egg-experiment>