Capillary Action Experiment with Celery

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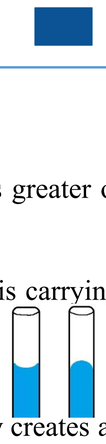
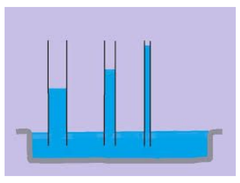
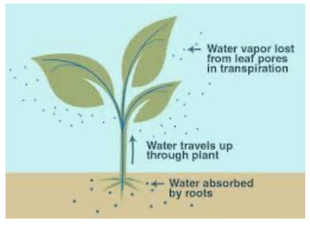
Experiment 1 info | Experiment 2 info | Both Experiments

Background Information

Capillary action: When adhesion of water in tube in this case the vascular tissue/veins is greater or less than cohesion of the water causing it to go up or down.
Adhesion: water sticking to other surfaces other than water
Vascular Tissues: The transportation in plants. Consisting of phloem and xylem. Phloem is carrying food and nutrient and xylem is carrying water.
Ground Tissue: The other functions the vascular and dermal don't do. The rest of the plant
Dermal Tissue: The skin and protection of plants.
Osmosis: When molecules pass from one side of the membrane to the other. This eventually creates an equilibrium







Question and Purpose

Experiment 1: Question: Can we see how fast different liquids travel up the stem of celery (**capillary action** and transpiration)?
Purpose: To figure out if the xylem transport different liquids- It if does, I think they will be transported more slowly because the celery isn't used to them.
Experiment 2: Question: Do all types of water go up the plant stem?
Purpose: To figure out if all variations of water went up the celery.

Hypothesis and the WHY

1- We predict **the liquid movement will stop** because of the carbonation in the Coke. We think the lemonade will start making its way to the top then stop on its way up because it will accept the sugar at 1st but then reject it. Then, it won't keep going up because of the sugar in the water. Lastly, the water will go up normally.

2- We predict that **the water will go up normally**. The sparkling water will start going up and then once it **loses its carbonation**, it will keep going up. We think the vitamin water will go up as well because it isn't as much of a different water.

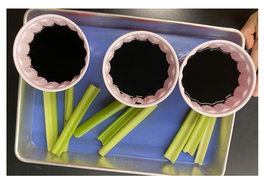
Method

1. Make lemonade from sugar, water and lemon juice. (add black dye)
2. Fill cup with coke and water, and put dye in each flask (same amount of dye)
3. Cut celery length so it is the same
4. Put celery in each flask
5. Come back at the end of Block 2 (1 hour later) and take 1 piece of celery out. Then measure how much the liquid has come up for each.
6. Come back at the end of Block 2 (1 hour later) (and take 1 piece of celery out. Then measure how much the liquid has come up for each.
7. Come back in class and measure/ take notes on progress to see how far up it has gone.

Variable: IV: different liquids **DV:** height of the liquid in celery **Constant:** food coloring, celery (height,type, ect), flask, timing, amount of liquid in flask ect. **Control:** water with food dye

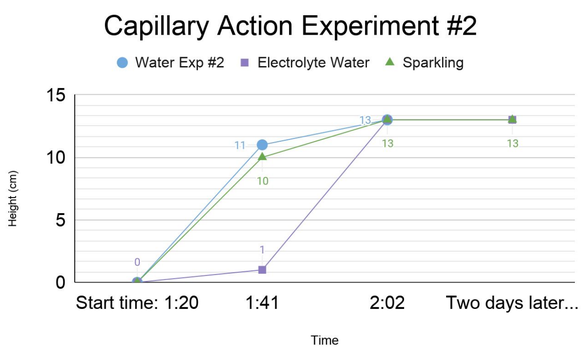
1) Cut all the celery to the same length
2) Fill cups with liquid
3) Put 3x celery in each cup at the start of class
4) 20m later take the first celery out *
5) 20m later take the second celery out*
6) Take the last one out next science class
7) Take notes/ make conclusion statement

Sparkling Water



Comparing: Control- different liquids

*Take notes on celery cut open to see how fast it went up

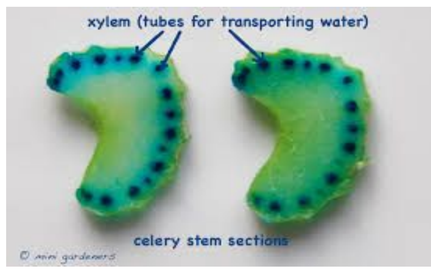


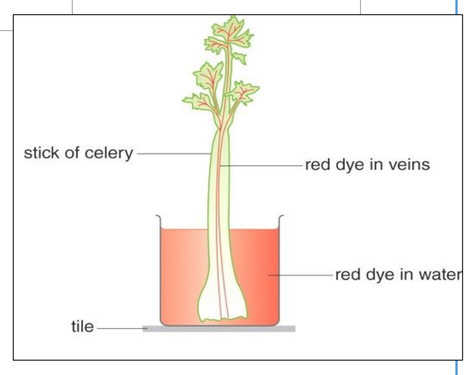
Graphs and Observations

Experiment 1 Observations

	Coke	Water	Lemonade
10:07 to 10:11am	-the inside is grayish -Coke has started (barely) to make its way up the **vascular tubes**	-Going up **xylem tubes** -Hasn't gotten to other tissues Gone up all the way (losing color farther up) -cut at various parts of the celery -Turgid	- flaccid -soft bendy and clear insides -the celery is still hard where the celery hasn't gotten yet
11:24 to 11:35 am	-Flaccid until ⅕ cm -Kept soaking into ground tissue but didn't go through **xylem** -Black around edges till ⅕ cm -didn't go up anymore	-Cut through middle and across -darker around the edges of celery -not as dark on the inside -black veins around the edge	-dark at bottom -cut at ½ cm -white on the inside -Lemonade got about 3mm up -flaccid -black around edge -vascular tubes are uncolored -no liquid deeper in
1:30 to 1:47 am	-Cut ½ cm -Didn't travel up farther -Softer on outside -White on inside -Bottom of celery black -**vascular tissue** normal	-color at random spots in **xylem** -turgid -once you cut more in you can see more color -colored cross-section -more time = more color in **xylem**	-**xylem** at the bottom is black -regular **xylem tubes** farther up -colored to about 1mm -clear at the bottom

Celery #1





Experiment 2 Observations

	Sparkling water	tap water	electrolyte
#2	-10cm up the liquid stopped -**ground tissue dark** all the way up -went up in less than 20 minutes	-went up 11cm -hard/turgid -inside **vascular tubes** are darkened too -ground tissue doesn't look too dark	-cut 1cm did go up -cross section is duller -turgid -outside darker -inside is untouched -1mm at most went up - ground loods karker - vascular tissue regular
#3	-went up all the way -**ground tissue** is darer farther up -cross section is black -still hard/turgid	-darker near mid -more white inside -tubes are dark -getting flaccid -is dark in random spots in the **vascular tissue**	-dark cross section -**ground tissue** not as dark -went up all the way -overall celery darker
	-black bottom -**vascular** dark all the way up -turgid	-**vascular tubes** dark -Got infected and inside is rotting away p -Water stopped traveling when got infected	-turgid -bottom of **xylem** is green -dark **vascular tubes** -curving a little at the top -pale inside

Results

#1-**Water:** For the water, it got up all the way in **less than an hour**. There were random splats of color in the **xylem**.

Coke & Lemonade: both the coke and lemonade the liquids soaked into the bottom of the tissue and **stopped** about **1 mm** up.

#2- Tap Water: Went up normally except for the infection in the end.

Sparkling Water: Went up all the way **fast,** got dark quickly too.

Electrolytes: Took **longer** for celery to accept electrolytes, but once it did it went up and **darkened fast.**

Conclusion

Experiment 1: In conclusion, we have realized that celery doesn't seem to take in anything other than water. The coke and lemonade went up about ¼cm before not going up further. Even though it didn't take in the other liquids, they still didn't alter the physical celery as much as the salt water did. When the celery was in the salt water, it got flaccid, in these liquids since it didn't get in to the celery system the celery didn't change. We wonder if different variations of water will go up the **vascular tubes**?

Experiment 2: In conclusion we figured out that celery takes water the fastest. In this experiment we saw that it took up normal (tap) water the fast. We also noticed it took longer to take up other types of water but then quickly adapted to accept We also learned that everything stayed turgid and the xylem got dark after a while. This experiment was a great way to show different variations of water and how they go up a plant stem. This happened because everything was water.

Next Questions

1) What affected the celery that made the liquids not go up?
2) We wonder if all waters variations will go up celery?
3) Did the sugar affect the coke and lemonade not going up.

1) We wonder why the salt was the only one to make the celery flaccid.

2) I wonder why the tap got infected but the other ones didn't?

3) I wonder how water gets infected?

Electrolyte Water

Electrolytes ingredients: Purified water, electrolytes, (potassium carbonate, potassium bicarbonate, magnesium sulfate