

Capillary Action in Celery

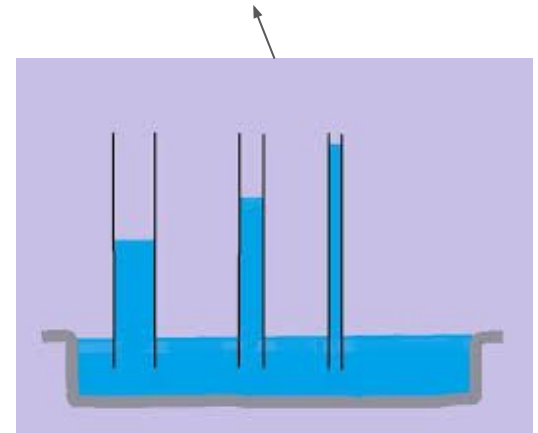
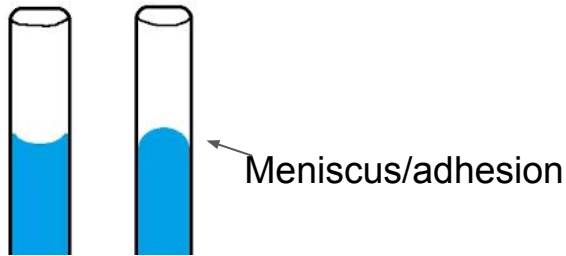
Some Humans: Yasmine, Jacob, and Stella

Mentor: Dr.Vrentas

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



New Information

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.

Transpiration: The process of water moving through a plant and evaporating off its leaves

Osmosis: When molecules pass from one side of the membrane to the other. This eventually creates an equilibrium



Question/Purpose of the experiment

Experiment 1: Question: Can we see how fast different liquids travel up the stem of celery (capillary action)?

Purpose: To figure out if the xylem transport different liquids- If it 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.

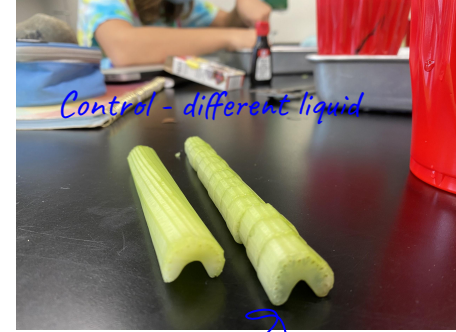
Hypothesis with reason WHY

1- We predict the carbonation in coke will cause the movement to stop. 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

Method



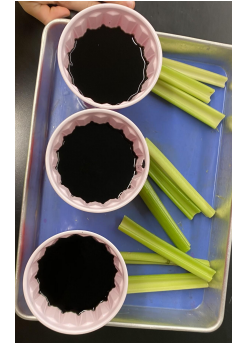
1. Make lemonade from sugar, water and lemon juice. (add black dye)
2. Fill cup with coke and water, and put dye in each flask (same amount of dye)
3. Cut celery length so it is the same
4. Put celery in each flask
5. Come back at the end of Block 2 (1 hour later) and take 1 piece of celery out. Then 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

Method Experiment 2

- 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

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



Sparkling
Water



<ul style="list-style-type: none"> -Cut $\frac{1}{4}$ cm, the inside is grayish -Coke has started (barely) to make its way up the vascular tubes -10:07 AM Hasn't touched $\frac{1}{2}$ cm 	<ul style="list-style-type: none"> -Cut at $\frac{1}{2}$ cm -Going up xylem tubes -Hasn't gotten to other tissues -10:10 am Gone up all the way (losing color farther up) -cut at various parts of the celery -Turgid 	<ul style="list-style-type: none"> -cut at $\frac{1}{2}$ cm -10:11 am -lemonade went up $\frac{1}{2}$ cm - flaccid -soft bendy and clear insides -the celery is still hard where the celery hasn't gotten yet
<ul style="list-style-type: none"> -Flaccid until $\frac{1}{5}$ cm -11:24 -Kept soaking into ground tissue but didn't go through xylem -Black around edges till $\frac{1}{5}$ cm -didn't go up anymore 	<ul style="list-style-type: none"> -Cut through middle and across -darker around the edges of celery -not as dark on the inside -cut at 11:30am -black veins around the edge 	<ul style="list-style-type: none"> -11:35 am -dark at bottom -cut at $\frac{1}{2}$ cm -white on the inside -Lemonade got about 3mm up -flaccid -black around edge -vascular tubes are uncolored -no liquid deeper in
<ul style="list-style-type: none"> -1:30 -Cut $\frac{1}{2}$ cm -Didn't travel up farther -Softer on outside -White on inside -Bottom of celery black 	<ul style="list-style-type: none"> -1:38 pm -color at random spots in xylem -turgid -once you cut more in you can see more color -colored cross-section 	<ul style="list-style-type: none"> -1:47pm -xylem at the bottom is black -regular xylem tubes farther up -colored to about 1mm -clear at the bottom

TIMES WHEN LIQUID WENT UP CELERY

Coke

Water

Lemonade

10:07 am

-Went up $\frac{1}{4}$ cm

-Went up all the way
-Not AS noticable

-Went up $\frac{1}{2}$ cm

11:25 am

-Didn't go up anymore

-Went all the way up
-Darker

-Went up about 3 millimeters

1:30 to

-Didn't travel up farther

-Darker

-Colored dark to 1 mm

1:47 pm

-Black nearer bottom

-Colored at random spots

Sparkling Water

Tap Water

Electrolytes

-10 cm up

-Up 11cm
-Vascular darkended

-Cut 1 cm , 1mm at most went up
-Most inside is untouched

-Went up all the way

-Dark near middle

-Went up all the way

-Dark vascular all the way up

-More and more color

-Dark vascular tissues

sparkling water	tap	electrolyte
<ul style="list-style-type: none"> -10cm up the liquid stopped -ground tissue dark all the way up -went up in less than 20 minutes 	<ul style="list-style-type: none"> -went up 11cm -hard/turgid -inside vascular tubes are darkened too -ground tissue doesn't look too dark 	<ul style="list-style-type: none"> -cut 1cm did go up -cross section is duller -turgid -outside darker -inside is untouched -1mm at most went up - ground looks darker - vascular tissue regular
<ul style="list-style-type: none"> -went up all the way -ground tissue is darker farther up -cross section is black -still hard/turgid 	<ul style="list-style-type: none"> -darker near mid -more white inside -tubes are dark -getting flaccid -is dark in random spots in the vascular tissue 	<ul style="list-style-type: none"> -dark cross section -ground tissue not as dark -went up all the way -overall celery darker
<ul style="list-style-type: none"> -black bottom -vascular dark all the way up -turgid 	<ul style="list-style-type: none"> -vascular tubes dark -Got infected and inside is rotting away p -Water stopped traveling when got infec 	<ul style="list-style-type: none"> -turgid -bottom of xylem is green -dark vascular tubes -curving a little at the top -pale inside

Pics from capillary action experiment #2



Results--average multiple trials, graphs? Talk to Dr. Sohl

#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-

Conclusions and next questions

Conclusion: In conclusion, we have realized that celery doesn't seem to take in anything other than water. The coke and lemonade went up about $\frac{1}{4}$ cm before not going up further. We wonder if different variations of water will go up the vascular tubes?

We think the celery didn't transport other liquids because it only wanted water to carry out all of its other tasks. It needed water for energy.

We wonder if all waters variations will go up celery?

Did the sugar affect the coke and lemonade not going up.

Conclusion Experiment #2

In conclusion we figured out the celery is reluctant to take in variations of water. It eventually takes the water slowly. They all stayed turgid and the xylem got dark in the end.

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

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

I wonder how water gets infected?

Pictures :)