

Please mute your microphones.
You may keep your video on if you wish.
We will begin shortly.

Thank you.



FYS

Leaf Pigment Extraction

Biology

Materials

- Leaves (spinach, cabbage, or other leafy greens)
- Rubbing alcohol
- Small cup and big cup/bowl (preferably glass)
- Coffee filters or paper towels
- Scissors
- Pen OR pencil+tape
- Anything to cover the beaker (plastic wrap, aluminum foil, a plate, anything!)



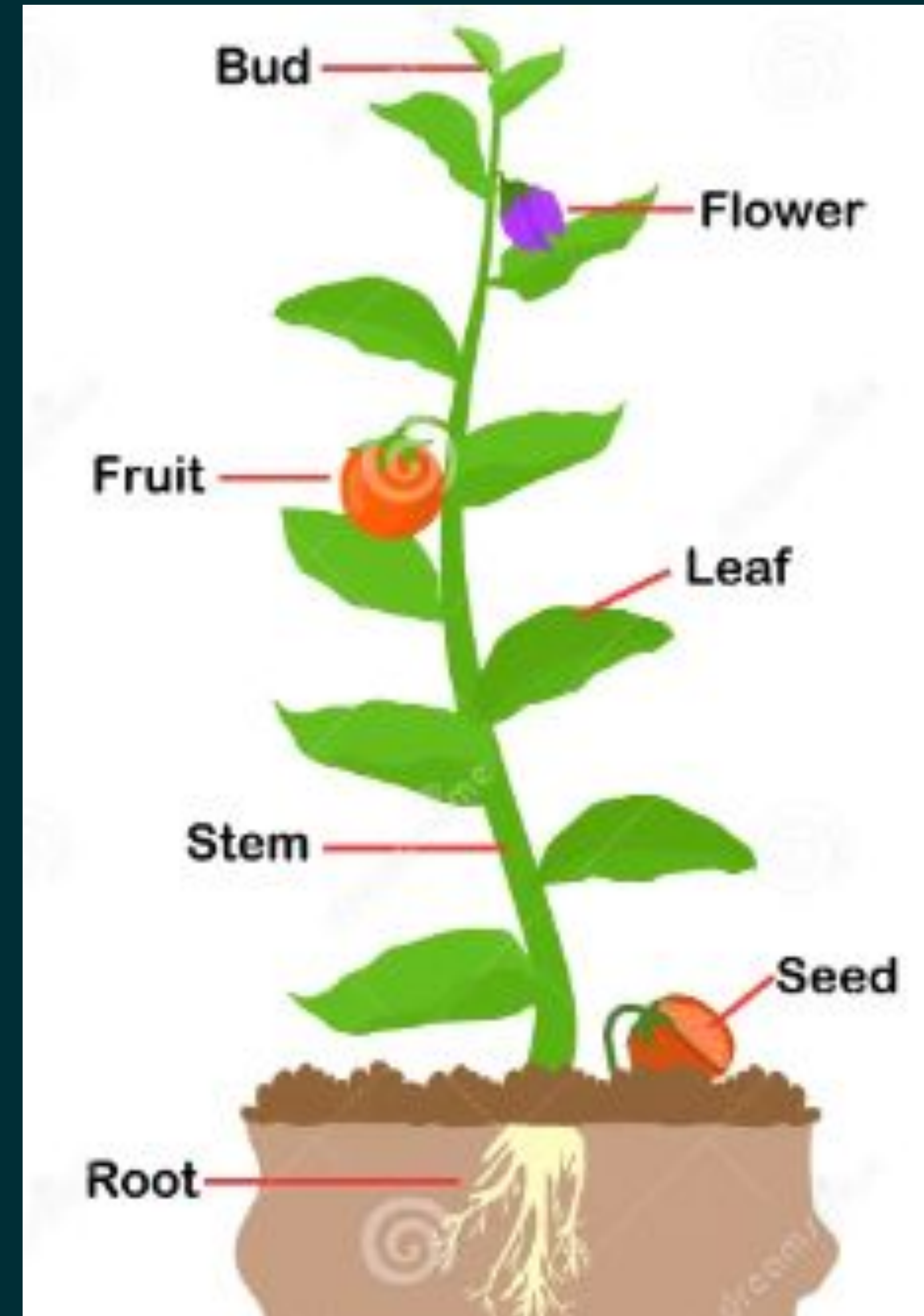
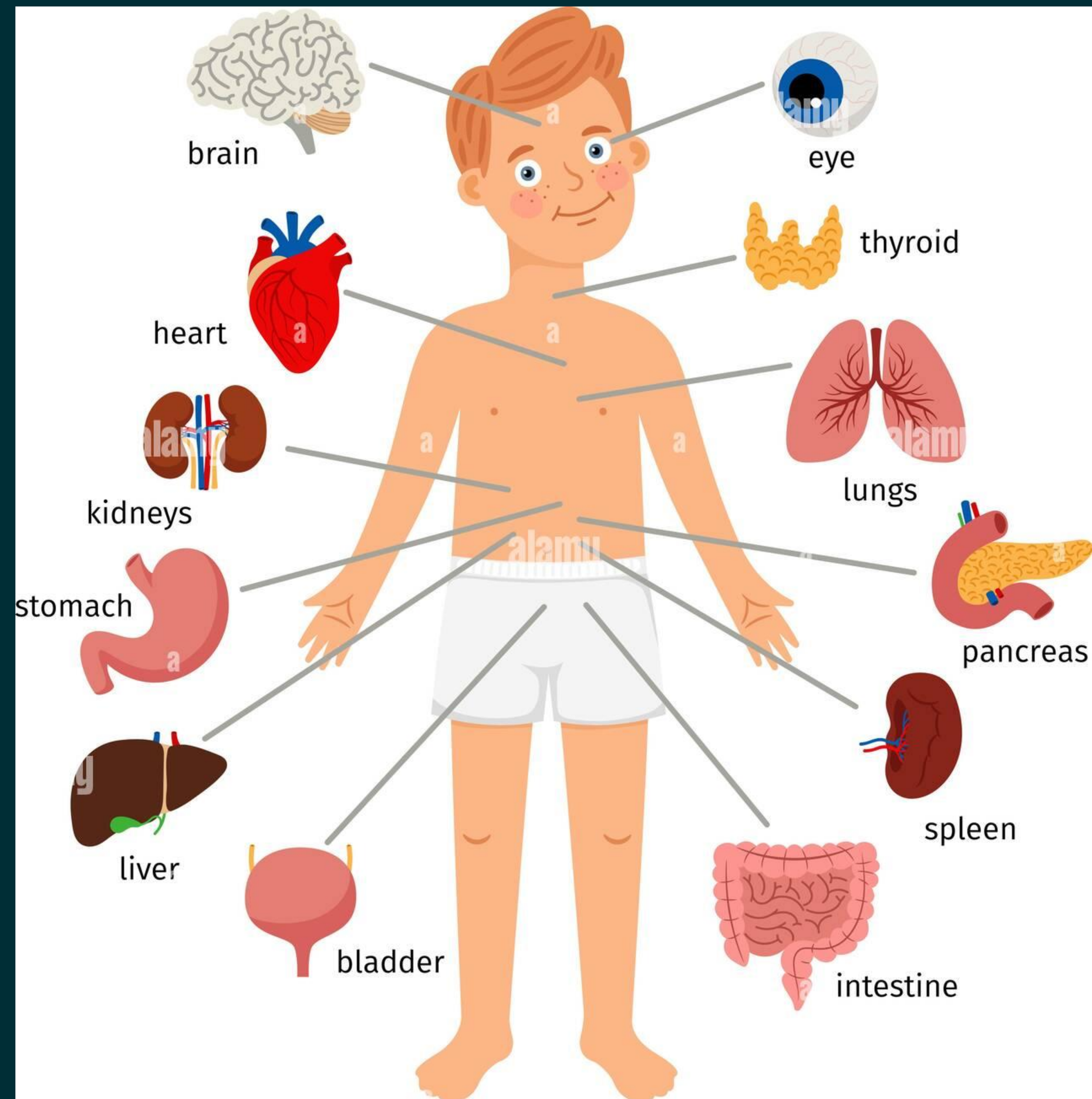
Part 1 of Procedure

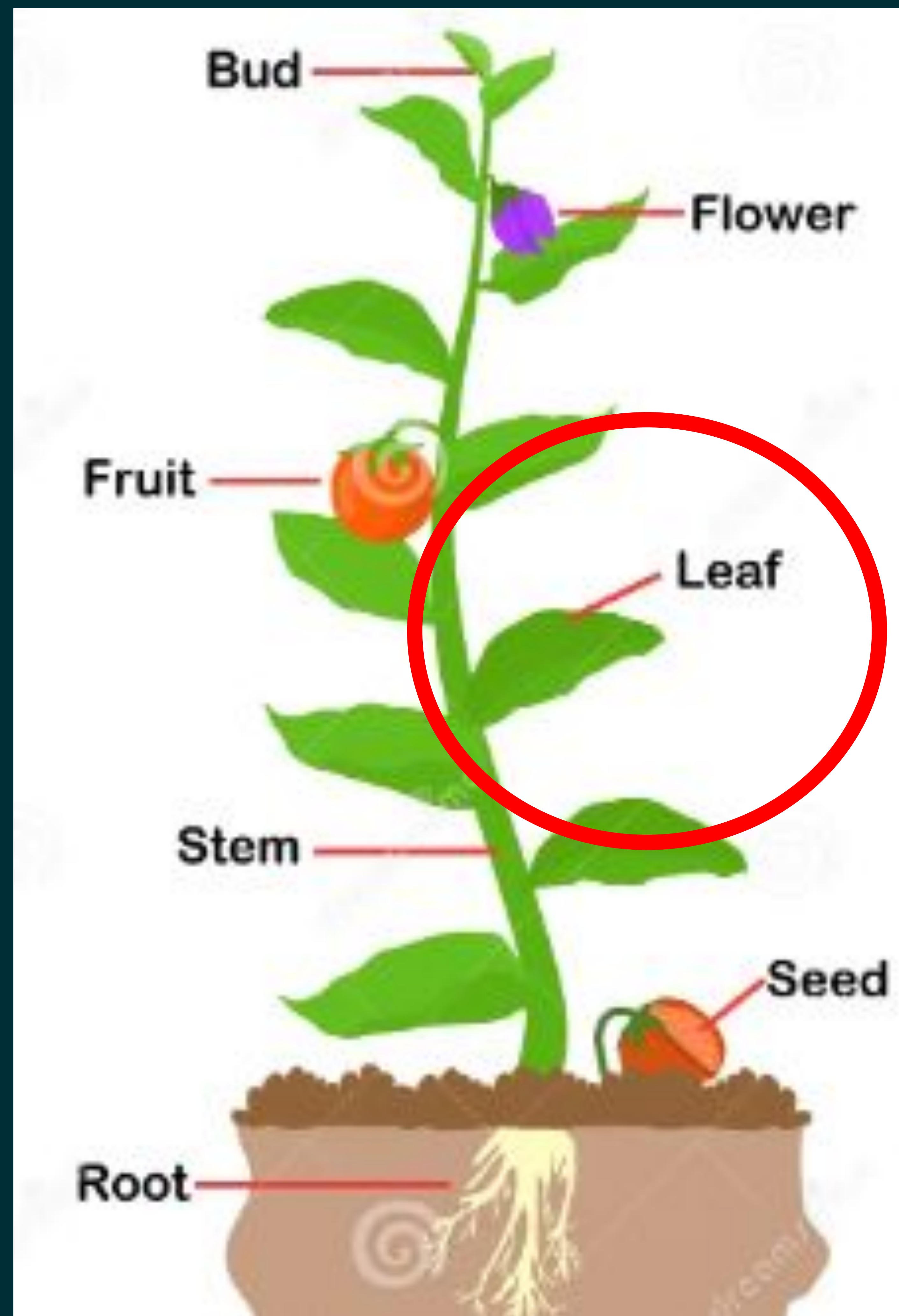
1. Tear the leaves into several pieces and place them in a cup, then add just enough rubbing alcohol to cover them.
2. Cover the beaker with anything to keep the alcohol from evaporating.
3. Put the cup in a dish of hot tap water for about 30 minutes, until the alcohol turns green as the pigments from the leaves are absorbed into it.
4. While we wait, let's learn!



Let's Think:

What makes us similar/different from plants?





Leaves

- **Food Makers:** Leaves use sunlight, air, and water to make food for the plant.
- **Green Color:** *Most* leaves are green because of something called chlorophyll. More on this later!
- **Sun Collectors:** Leaves catch sunlight to help the plant grow.





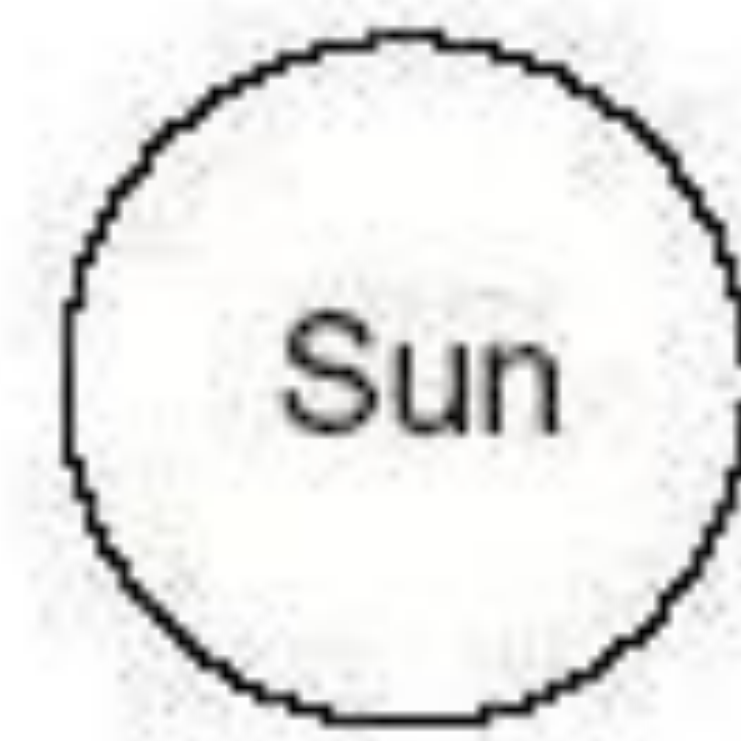
Questions?



Question:

We breathe in oxygen, and we breathe out carbon dioxide. But where does all of that oxygen come from? Where does our carbon dioxide go?

Plants! Plants and animals (like us) have a relationship that helps us survive. We inhale their oxygen and exhale carbon dioxide. They then take that carbon dioxide and produce oxygen. And then we take in that oxygen and the cycle repeats!



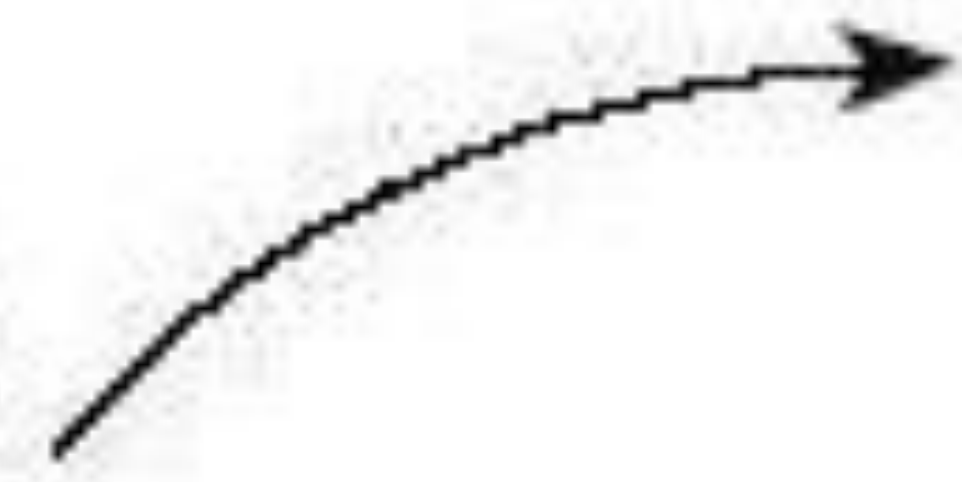
Plants

Oxygen



Animals

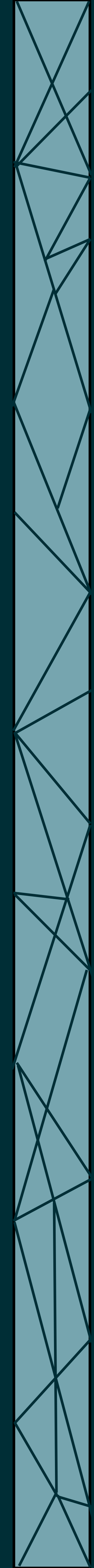
Carbon dioxide





Question:

What happens if you don't water a plant, or you don't give it enough sunlight?

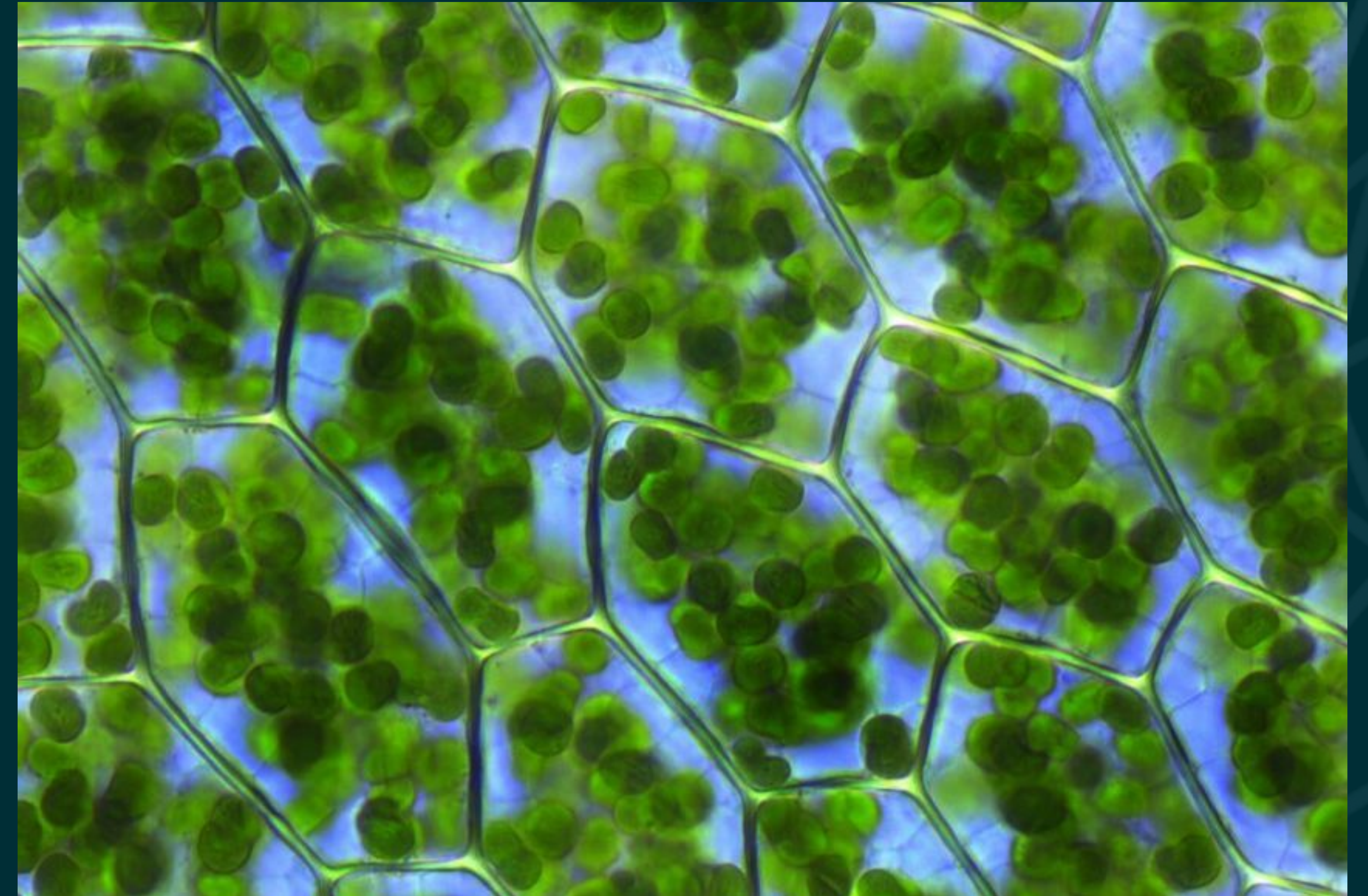


Photosynthesis

- To make their own food, leaves need a few different ingredients.
- Leaves absorb **sunlight** for energy.
- Leaves take in the **carbon dioxide** that we breathe out, and they also absorb **water** from the ground.
- Using a special substance known as **chlorophyll** and the sunlight taken in, they will turn carbon dioxide and water into **sugar** and **oxygen**.
- They will then use the **sugar** to survive! What happens to that oxygen?
- They release it into the air, and we breathe it in!

Chlorophyll

- Chlorophyll is a **green pigment** found in plants. The reason leaves are green is because of chlorophyll.
- It captures sunlight and turns it into energy for photosynthesis
- The pigment is stored inside plant cells (shown on the right).
- It can be extracted, which is what we're going to do!



Now it's time to check on our
experiment!

Materials

- Coffee filters or paper towels
- Scissors
- Pen OR pencil+tape



Part 2 of Procedure

- 1. Cut a strip of filter paper about an inch wide and 6 inches long (or however tall the cup is) and tape it to a pencil or hook it onto the pen's clip.*
- 2. Suspend the pencil/pen across the beaker and let the strip just barely touch the alcohol and pigment mixture. Now we have to wait again!*



What do you think is going to
happen to the coffee
filter/towel?



Why does this happen?



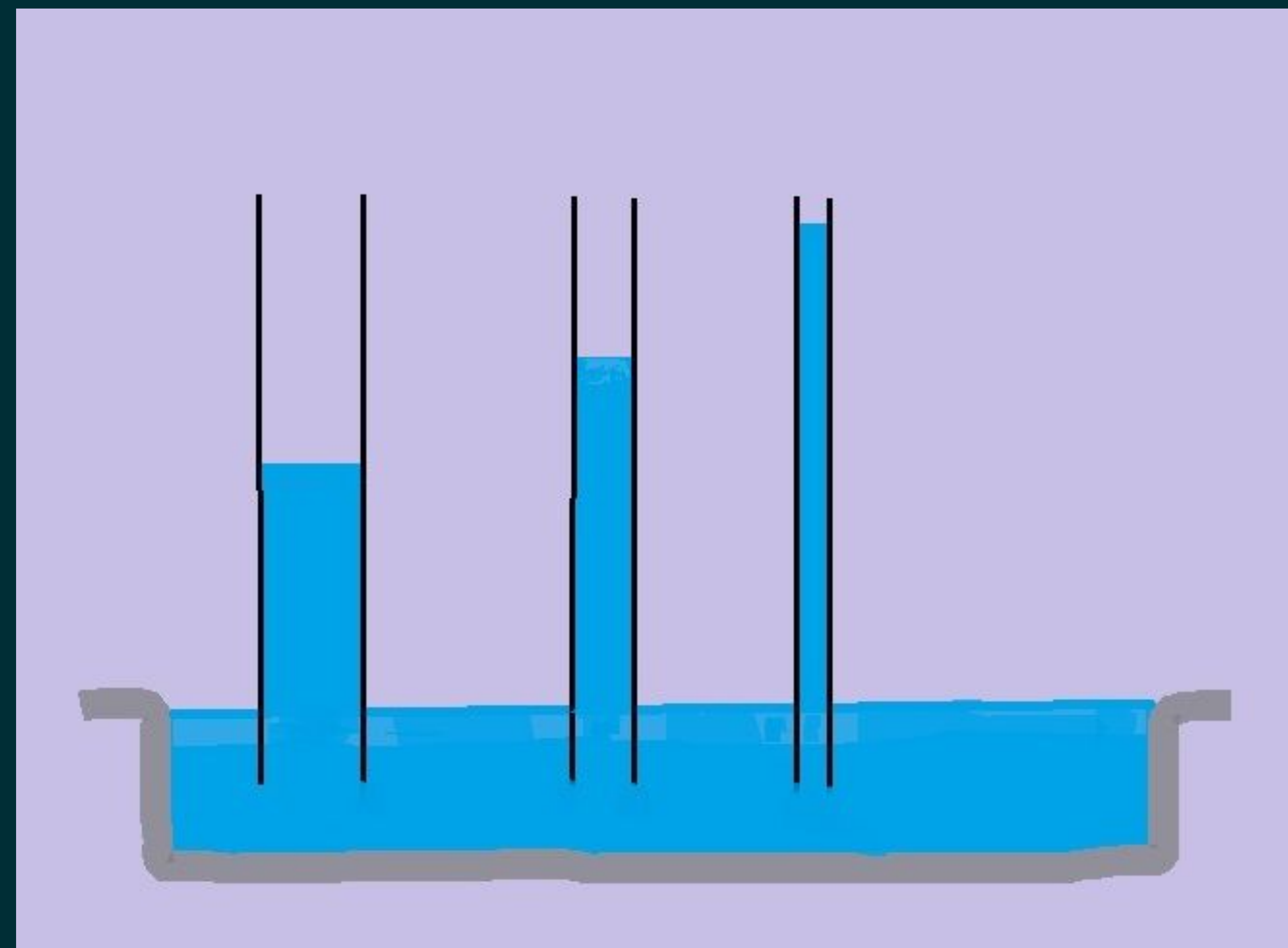
Question:

If you put a straw into a glass of water, you might notice something about the water levels in the straw and in the glass.
What do you see?



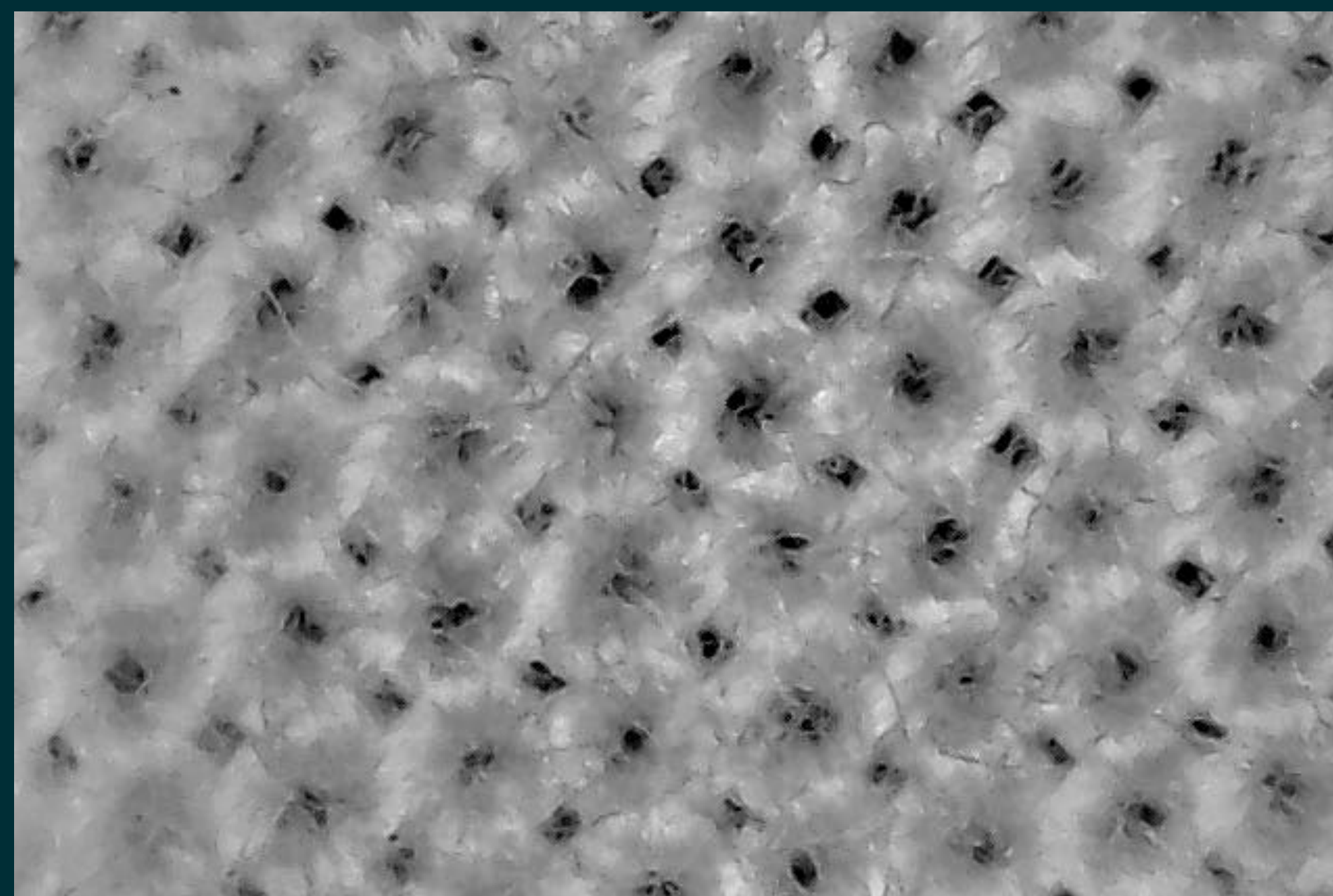
Capillary Action

- Water molecules are attracted to each other. This is called **cohesion**.
- Water molecules are attracted to the sides of the straw and the glass too. This is called **adhesion**.
- However, in narrower spaces, adhesion happens more strongly than cohesion. That's why the water level is higher in the straw!



Capillary Action (cont.)

- Coffee filters, which we're going to be using, have **microscopic holes** that cause capillary action to occur, just like the straw but on a smaller scale.
- Fun fact: plants also use capillary action! They use this process to pull water up from the ground through small, narrow tubes, which is necessary for photosynthesis!





Questions?



Now that we've learned the science behind what happened, let's move on to some reflection questions!

Come back in 40 minutes and look at the experiment.

Reflection Questions

- 1. Why did we use rubbing alcohol?*
- 2. What are some real-world situations where understanding leaf pigments and their extraction could be useful?*
- 3. What other parts of a plant besides the leaf might contain pigments? Why?*
- 4. What is one fact that you learned during this experiment?*
- 5. What was your favorite part of this experiment?*

See you all next week!

Visit our website, **futureforyoungscientists.org**.

If you have any photos from this week, please share these with us by email (futureforyoungscientists@gmail.com) or Facebook, as we would like to be able to share everyone's experience.

FYS will be having a different set of educators for a **new** session after our lessons end. More information about them can be found on our website under the "Nebula" tab.