Name: _____ Date: _____ Block/Period: ____

Pumpkin Dissection

The word pumpkin comes from the Greek word, pepo, which means large melon. Pumpkins represent one of the oldest domesticated plants that originated in Northeastern Mexico and the southern United States. The largest pumpkin has ever grown and weighed in at 2,702 pounds!

In this activity, you will be exploring the anatomy of a pumpkin and using a microscope to see a variety of cell types and determine how their structure relates to their function. You will be taking measurements, estimating, and using the microscope to help you explore the anatomy of a pumpkin.

Materials

- Pumpkin (some parts may be prepared by your teacher)
- Dissection microscope or magnifying glass
- Microscope
    - Slides
    - Coverslips
    - Pipettes
    - Small Container for a water-50ml beaker
- Carving knife (your teacher may choose to make the cuts before class)
- Tape measure or string
- Metric rulers
- Newspaper
- Bowl or container
- Toluidine Blue O or similar stain
- Carving tools if completing the carving

Dissection Procedure:

1. Predict the circumference of your pumpkin at its widest point.

Predicted Circumference: _____

Measure the circumference of your pumpkin and record the circumference below.

Actual Circumference: _____

How does your actual circumference compare to the predicted circumference?

External Examination

Looking at the outside of the pumpkin, indented ridges run from the stem to the blossom end of the pumpkin these ridges are called ribs. Count the number of ribs on your pumpkin. Compare the number of ribs on your pumpkin to another group (if applicable).

Number of ribs on your pumpkin: _____

Number of ribs on another group's pumpkin: _____

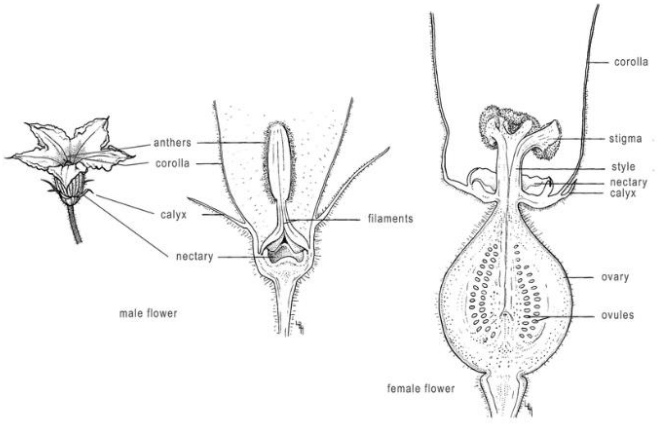
Place your pumpkin on its side and look at the bottom. On the bottom of the pumpkin, you will see a circular structure. This structure is the blossom end. Measure the diameter of your pumpkin blossom end and record it below:

Blossom end: _____

Pumpkin Reproduction

The female flower's ovule (female gamete), if fertilized by pollen (male gamete), develops into a pumpkin. Pumpkin plants are sexually reproducing organisms. The first eight flower buds appearing on a new pumpkin plant usually form only male flowers. The first female flower opens about one week after the first male opens. The flowers only last for a few hours. They bloom at dawn and close within a few hours. Pumpkin plants grow a fruit (pumpkin) only if pollinated by insects. Bees visiting flowers transfer pollen from the male flower to the female resulting in a fertilized cell called a zygote that grows into the fruit (pumpkin).

Pumpkin flowers



Quick Check:

What is the male gamete of a pumpkin plant?

What is the female gamete of a pumpkin plant?

Describe how the fertilization of the ovule results in a pumpkin. Think about how cells reproduce when constructing your response.

After examining the blossom end stand your pumpkin back up. Look at the stem of the pumpkin. The stem is often used as the "handle" to carry the pumpkin. Examine the stem. Remove a portion of the stem so it can be observed using a dissecting microscope or a magnifying glass. Your teacher may have already cut the stem for you.

Describe what you see using the dissecting microscope.

Based on what you see, what do you think the function of the stem is? Be sure to justify your response.

Why are pumpkins orange?

When pumpkins are growing, they are green. The pumpkins are green because of the photosynthetic organelle called the chloroplast which has a green pigment called chlorophyll. Chlorophyll is the main photosynthetic pigment used to capture light and generates carbohydrates. As the days get shorter and the nights get longer the chlorophyll production in the plant slows down and eventually stops. When the chlorophyll breaks down the carotenoid pigments become visible and the pumpkin changes color from green to shades of orange, red, and yellow. This is the same way that leaves change color in the fall.

Research and write the formula for photosynthesis in the space below:

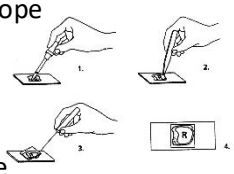
Circle the carbohydrate in the formula above.

Why do you think it is important for the plant to be green while it is growing?

PROCEDURE:

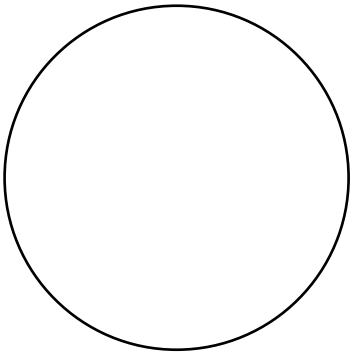
Making a Wet Mount

1. Obtain a thin slice of the pumpkin's skin. (Your teacher may have done this for you)
- Use a scalpel or a fine blade to cut a thin slice of skin. As thin possible.
2. With a medicine dropper, place one drop of water in the middle of a clean glass microscope slide.



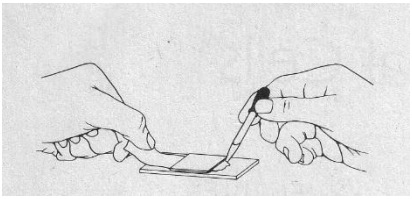
3. With forceps, place the pumpkin slice in the drop of water as seen in the diagram.
4. Hold a coverslip at a 45° angle to the slide at the edge of the drop of water as seen in the diagram on the next page. Lower the coverslip slowly to avoid forming air bubbles.
5. Place your wet mount on the microscope stage.
6. Using the low-power objective, center and focus the microscope on the pumpkin slice.
7. Work your way to high power centering your pumpkin at each magnification. Sketch or take a picture of your pumpkin slice and insert it in the space below. Record the magnification of your view in the space below.

Unstained Pumpkin Skin Cells:



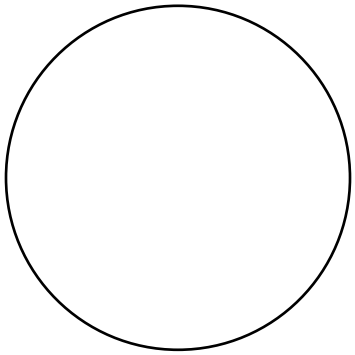
Total Magnification: _____

8. Remove the slide from the microscope. Using a medicine dropper, place a drop of Toluidine Blue O solution at one edge of the coverslip. Toluidine Blue O is a stain Place a small piece of paper towel on the opposite edge to draw the Toluidine Blue O solution under the coverslip, as shown in the figure below.



9. Examine the stained pumpkin cells under low power. Note the appearance and compare it to the unstained cells. Switch to high power. Make a diagram of the stained cells or insert a picture of your view below.

Stained Pumpkin Skin Cells:



Total Magnification: _____

After examining the pumpkin skin cells under a microscope describe the structure of the cells and how it relates to their function.

Internal Examination

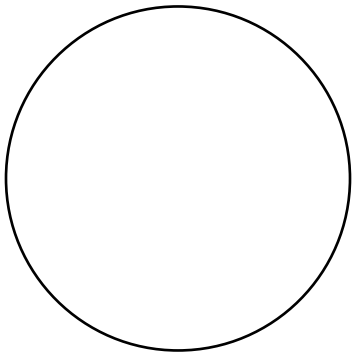
After viewing the pumpkin skin, make an incision on the top of the pumpkin around the stem as you would when carving a pumpkin to remove the seeds. (Note: Your teacher may do this for you)

After your incision has been made, remove the lid of the pumpkin. Reach into the pumpkin and obtain a few pieces of the fibrous strand. The fibrous strand inside the pumpkin connects to each seed and provides the necessary nutrients for seed development.

Prepare a wet mount slide using the same procedure you did before.

Tip: Use a mortar and pestle (or something similar) to create a mush of fibrous strands. It helps when viewing the cells. You may choose to stain your sample just as you did in the previous step.

Fibrous Strands:



Total Magnification: _____

After examining the pumpkin fibrous strands under a microscope describe the structure of the cells and how it relates to their function.

Open Exploration:

Now that you have completed the guided dissection portion of the lab you can feel free to explore other parts of the pumpkin.

Recommended structure to check out:

- Flesh-mush it up into a pulp and view it under the light microscope.
- Seed- break it about and see what is inside. Use the dissecting microscope to view it seed.

What interesting observation did you make? Insert some of your cool pictures in the space below.

Teacher Notes

An answer key and other supporting information can be found in our member's area. Become a member and gain access to everything you need to teach biology and environmental science.

Learn more: https://www.usbiologyteaching.com/full-biology-curriculum

Standard Covered

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms

HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

HS-LS3-2. Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

Extension Activity

Have students carve the pumpkin! Students can carve/draw/paint their favorite macromolecules or cells (or other topics of your choice). Students should be required to label their diagrams as appropriate. Students can vote on their favorite design.