Cell Structure: Comparison of Potato Tuber, Elodea Leaflet, Leaf Epidermal Cells, Onion Bulb Cells and Cheek Cells

The cell is the fundamental unit of life. In many multicellular organisms, cells can be specialized and work together to accomplish a specific function. Cells that work together for a specific function are called a tissue. When different tissues combine they can form an organ that has a specific function. For example, your heart is an organ that is composed of muscle tissue, connective tissue, nerve tissue and epithelial tissue. All of these tissues work together to insure the heart functions as it should. Plants also have tissues and these tissues work together to form organs. The tissues are specialized for their functions just as the organs are specialized for their functions. In today's activity you will creating wet mounts of several plant parts. Two of these wet mounts, the onion bulb and potato tuber you will stain with iodine. The elodea leaflet you will observe and then treat with a salt water solution to observe osmosis.

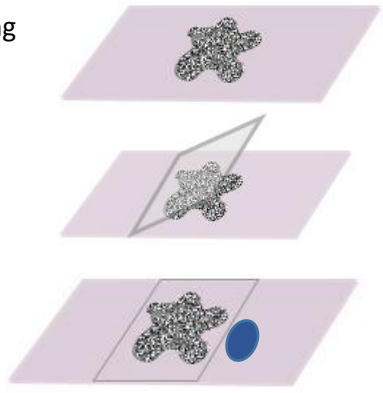
Materials

Microscope slides – 3
Cover slips – 3
Potato
Iodine
Elodea
Onion bulb
Any plant with thick leaves
Razor blade, knife or scalpel
Distilled water
Paper towel
10% NaCl

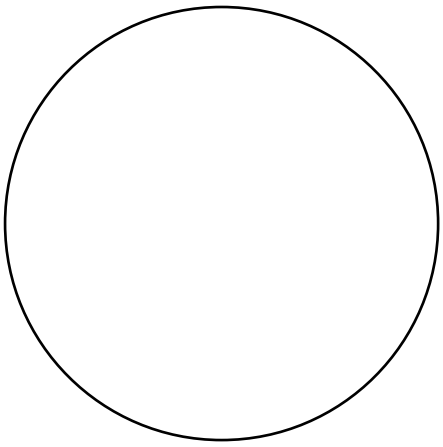
Procedure

Wet mount of onion cells

1. Remove a clean slide and coverslip from the materials box on the bench.
2. Add a small drop of water to the center of the slide.
3. Peel a small piece of the inner epidermis of a slice of onion. The inner epidermis is the thin skin on the inside curve of the onion.
4. Suspend the skin in the drop.
5. Pick up the coverslip and slide it across the slide at a 60 degree angle. Once the coverslip hits the drop, let the coverslip drop on to the specimen. Angling the coverslip, rather than dropping the coverslip flatly onto the smear minimizes the air bubbles that form under the coverslip.
6. Add a drop of iodine to the slide at the edge of the coverslip, not on the coverslip.
7. Apply a piece of paper towel to the opposite side of the coverslip to pull the stain across the slide.
8. Place the slide on the microscope. Start with the scanning objective (4X). Onion epidermal cells will look like stacked rectangular boxes.
9. Continue increasing magnification until you reach 400X. Don't forget to adjust the light levels as you increase magnification.
10. Draw at least 3 cells in the circle below. Remember to exaggerate the size of the cells. Label the nucleus, cell wall, plasma membrane, and cytoplasm. Make sure to include the magnification.



Plant cells, unlike animal cells have a thick cell wall. The plasma membrane is present but is not as obvious as the cell wall.



Specimen: _____

Magnification: _____

Description:_____

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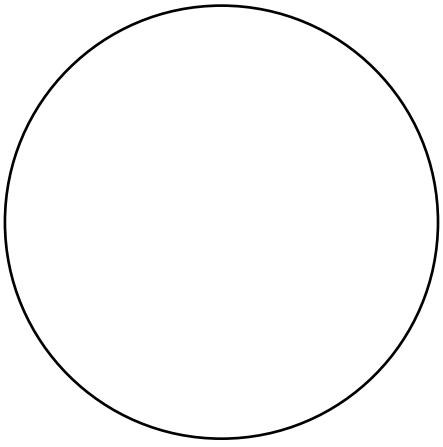
Wet mount of potato cells

Potatoes are storage tubers. The potato plant stores its energy in the form of starch in the cells in the tuber.

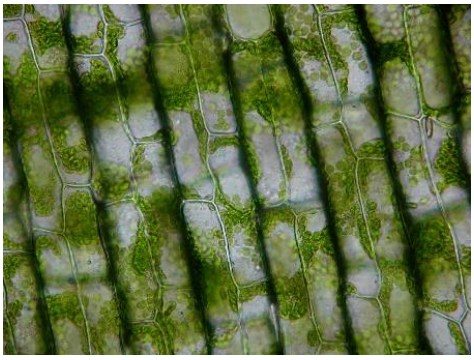
1. Remove a clean slide and coverslip from the materials box on the bench.
2. Add a small drop of water to the center of the slide.
3. Slice a very, very thin piece of potato. The slice can be less than 0.5 cm wide and 0.1 cm thick.
4. Suspend the slice in the drop.
5. Pick up the coverslip and slide it across the slide at a 60 degree angle. Once the coverslip hits the drop, let the coverslip drop on to the specimen. Angling the coverslip, rather than dropping the coverslip flatly onto the smear minimizes the air bubbles that form under the coverslip.
6. Add a drop of iodine to the slide at the edge of the coverslip, not on the coverslip.
7. Apply a piece of paper towel to the opposite side of the coverslip to pull the stain across the slide.
8. Place the slide on the microscope with the objective over the side of the coverslip where the iodine was applied. Start with the scanning objective (4X). What interaction do you see occurring between the iodine and the potato's starch granules?
9. Continue increasing magnification until you reach 400X. Don't forget to adjust the light levels as you increase magnification.
10. Draw at least 3 cells in your lab report. Remember to exaggerate the size of the cells. Label the cell wall, plasma membrane, starch granules, and cytoplasm. Make sure to include the magnification.



Specimen: _____

Magnification: _____

Description:_____



Wet mount of elodea

1. Remove a clean slide and coverslip from the materials box on the bench.
2. Add a small drop of water to the center of the slide.
3. Select a leaflet from the elodea alga. Pick a leaflet from the growing end.
4. Suspend the slice in the drop.
5. Pick up the coverslip and slide it across the slide at a 60 degree angle. Once the coverslip hits the drop, let the coverslip drop on to the specimen. Angling the coverslip, rather than dropping the coverslip flatly onto the smear minimizes the air bubbles that form under the coverslip.
6. Place the slide on the microscope. Start with the scanning objective (4X). Then proceed to the 10X objective.
7. You will see distinct green ovals within the leaflet. Those are the chloroplasts. Watch the leaf for a few minutes. What do you see? Are the chloroplasts moving? If so, that is called cytoplasmic streaming. The cytoskeleton is moving the chloroplasts around the cell. Where are the chloroplasts? Are they equally distributed around the cell or are around the periphery? How do you explain this observation?

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9. Continue increasing magnification until you reach 400X. Don't forget to adjust the light levels as you increase magnification.
10. Draw at least 5 cells in your lab report. Remember to exaggerate the size of the cells. Label the cell wall, plasma membrane, chloroplast, nucleus, and cytoplasm. Make sure to include the magnification.

Specimen: _____

Magnification: _____

Description:_____

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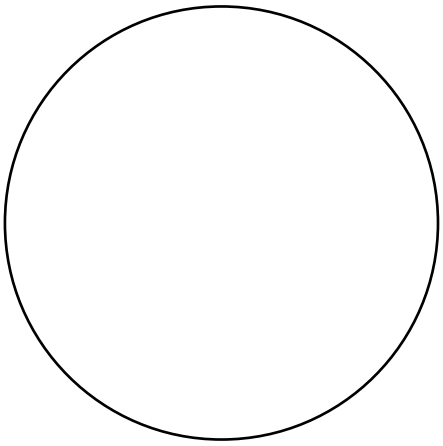

Wet mount of leaf epidermal cells

1. Remove a clean slide and coverslip from the materials box on the bench.
2. Add a small drop of water to the center of the slide.

3. Peel or carefully slice a small piece from the underside of a leaf. This can be challenging, but you only need a very small piece.
4. Suspend the slice in the drop.
5. Pick up the coverslip and slide it across the slide at a 60 degree angle. Once the coverslip hits the drop, let the coverslip drop on to the specimen. Angling the coverslip, rather than dropping the coverslip flatly onto the smear minimizes the air bubbles that form under the coverslip.
6. Add a drop of iodine to the slide at the edge of the coverslip, not on the coverslip.
7. Apply a piece of paper towel to the opposite side of the coverslip to pull the stain across the slide.
8. Place the slide on the microscope. Start with the scanning objective (4X). Leaf epidermal cells vary in shape. They typically have geometric shapes, rectangular, hexagonal, etc. Special cells, called guard cells look like lips embedded within the leaf. These cells contain chloroplasts.
9. Continue increasing magnification until you reach 400X. Don't forget to adjust the light levels as you increase magnification.
10. Draw at least 3 cells in your lab report. Remember to exaggerate the size of the cells. Label the nucleus, cell wall, plasma membrane, chloroplasts, stoma, and cytoplasm. Make sure to include the magnification.

Plant cells, unlike animal cells have a thick cell wall. The plasma membrane is present but is not as obvious as the cell wall. Guard cells allow gases to pass into and out of the leaf. The gases pass through the opening between the guard cells. The opening is called the stoma.

Specimen: _____

Magnification: _____

Description:_____

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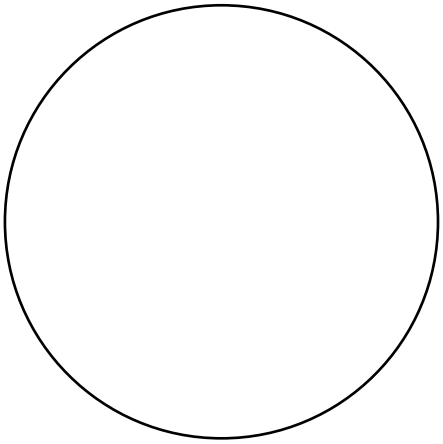
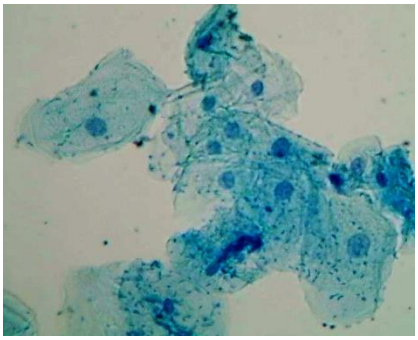
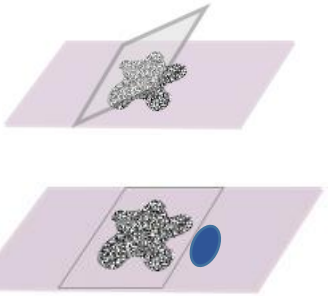


Wet mount of cheek cells

1. Remove a clean slide and coverslip from the materials box on the bench.
2. Add a small drop of 0.9% NaCl to the center of the slide.
3. Use the blunt, rounded end of a toothpick to gently rub the inside surface of your cheek.
4. Stir the toothpick into the drop of NaCl and spread the drop to the size of a nickel. Don't worry if you don't see anything in the drop. There are plenty of cells in the drop.



5. Pick up the coverslip and slide it across the slide at a 60 degree angle. Once the coverslip hits the drop, let the coverslip drop on to the specimen. Angling the coverslip, rather than dropping the coverslip flatly onto the smear minimizes the air bubbles that form under the coverslip.
6. Add a drop of methylene blue to the slide at the edge of the coverslip, not on the coverslip.
7. Apply a piece of paper towel to the opposite side of the coverslip to pull the stain across the slide.
8. Place the slide on the microscope. Start with the scanning objective (4X). Cheek cells will look like blue dust.
9. Continue increasing magnification until you reach 400X. Don't forget to adjust the light levels as you increase magnification.
10. Draw a clump of at least 3 cells. Remember to exaggerate the size of the cells. Label the nucleus, plasma membrane and cytoplasm. Do you notice any bacteria on your cheek cells? Make sure to include the magnification.



Specimen: _____

Magnification: _____

Description:_____

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1. Both the onion and the potato were stained with iodine. What structures stained yellow-brown in both slides? What structures stained blue-black?

2. How do the structures of the different plant cell types reflect their functions?

3. Human cheek cells and plant epidermal cells are both designed to protect the underlying tissue. What structural differences are there between human cheek cells and plant epidermal cells?

4. Why did you use 0.9% NaCl to suspend the cheek cells rather than water?