How does this affect the size of objects that can be viewed under the stereomicroscope? _____

_____

Compound light microscopes work by having light pass through the objects to be viewed. However, not all objects are translucent. If an opaque object is viewed through a compound light microscope, what will you see? _____

Use your knowledge of the compound microscope to identify the parts of the dissecting microscope. Write the names of the parts on the lines provided below. (eyepieces or oculars, focus knob, body tube, arm, objectives, stage, and base).

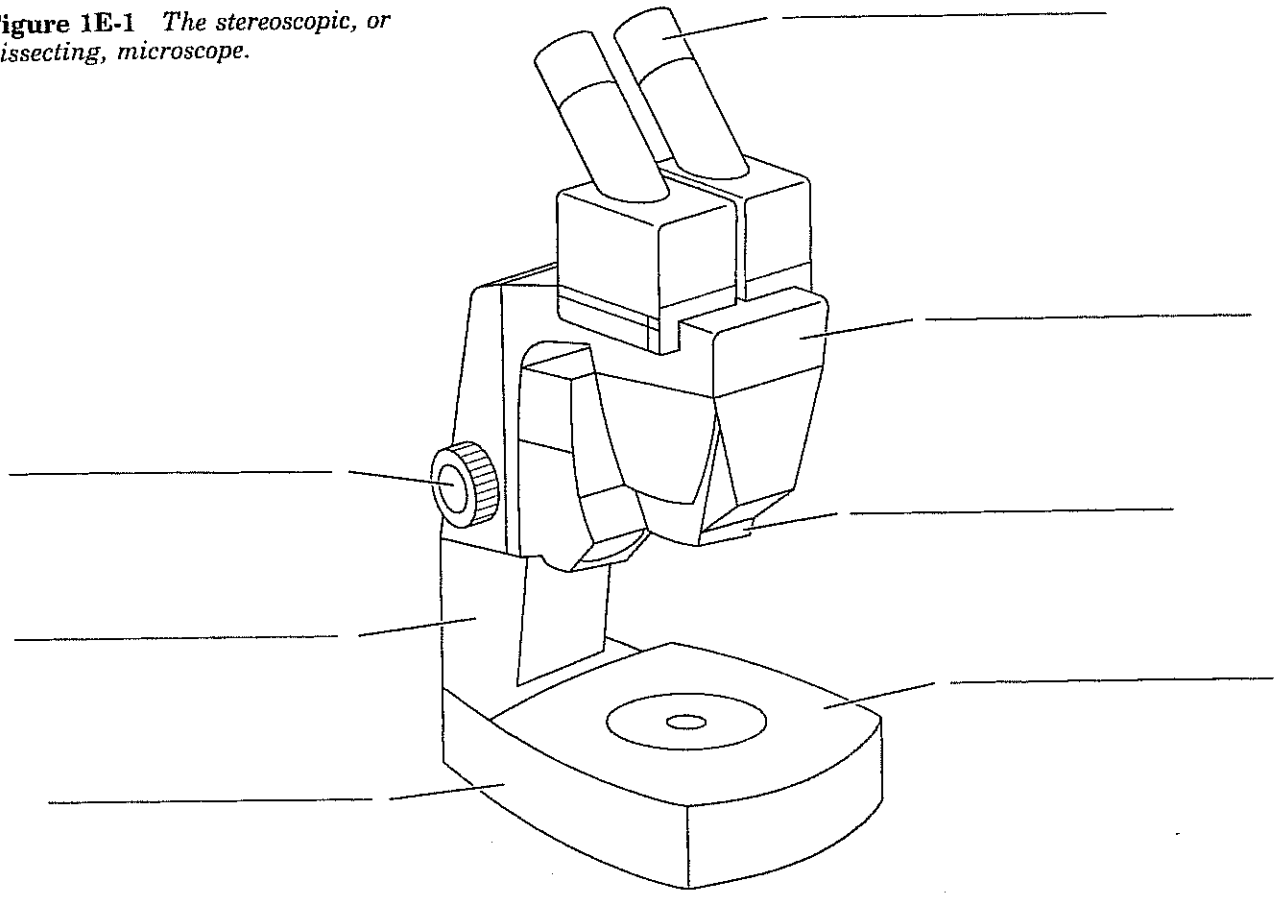


Figure 1E-1 *The stereoscopic, or dissecting, microscope.*

Put a few table salt crystals in a dish and view them under the stereoscope. What geometric shape best describes the salt crystals? _____

Try using both reflected and transmitted light to view the salt crystals. Show your calculations for determining the size of a crystal.

Calculations:

Magnification _____

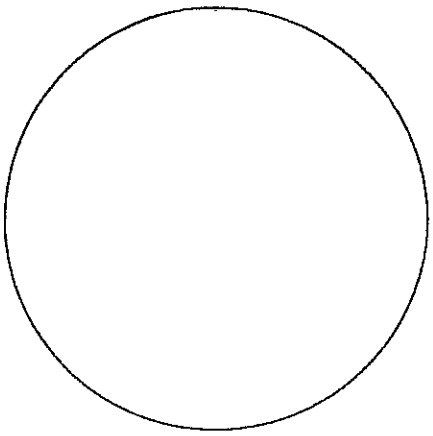
Crystal size _____

Verified _____

Obtain a plant leaf for viewing under the stereoscope. Try using both reflected and transmitted light to illuminate your specimen. Which works better? _____ Why? _____

_____

Draw a section of the leaf in the space to the right. Use color in your drawing, as needed.



Magnification _____

Verified _____

To get the feel of working under the dissecting microscope, use two dissecting needles to dissect a vein out of the leaf. Move the vein around with the needles to get a more complete view of its structure.

Vein dissected _____

List two advantages to using the stereoscope over the compound light microscope:

_____

_____

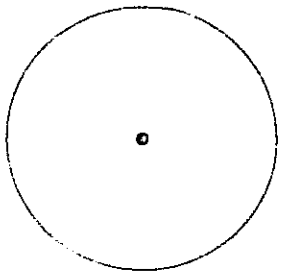
When searching a slide for even small objects, it is best to start with low power. Explain why: _____

_____

A microscope has a 100x magnification field measuring 4 mm. What is the size of the field at 100x in micrometers? _____ What would the size be at 200x on the same microscope? _____ (Show your calculations below.)

What would the field size be at 450x on the scope? _____ (Show your calculations below.)

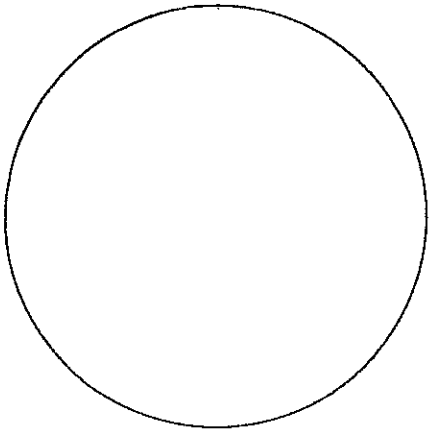
The circle to the right below represents the field of view when using the 10X objective. Using the same center point, draw a circle that would approximate the field of view at 43X.

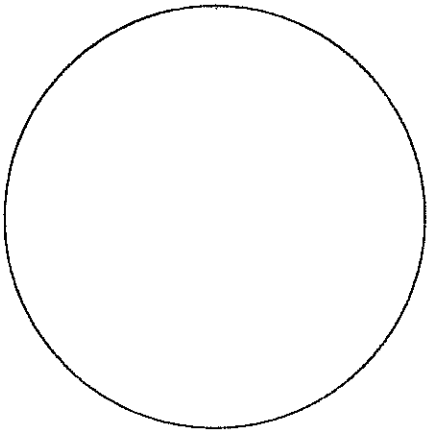


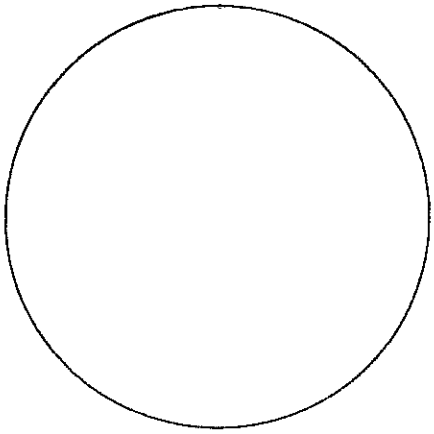
Why are objects frequently lost when switching to high power?

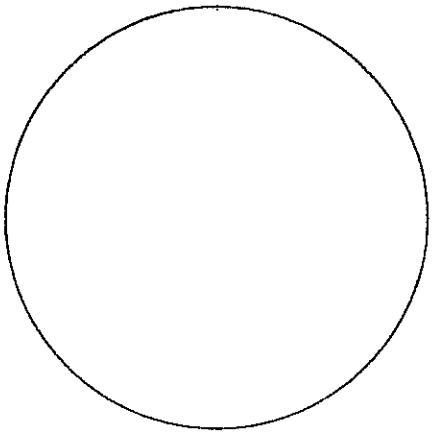
_____

Additional observations:









Multicellular Organisms

Multicellular organisms are composed of groups of specialized cells, called tissues, that together perform particular functions for the organism. Tissues, in turn, may be grouped to form organs, and organs may be grouped into organ systems. In this lab study, you will examine some of the cells that compose the basic tissue types of plants and animals.

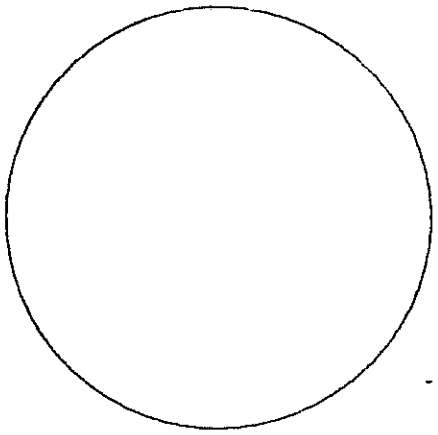
Plant Cells

Multicellular organisms that are photosynthetic are in the plant kingdom. The major characteristics of a typical plant cell are readily seen in the leaf cells of Elodea, a common aquatic plant. Prepare a wet mount and examine one of the youngest (smallest) leaves from a sprig of Elodea under the compound microscope.

Identify the following structures:

- The cell wall is the rigid outer framework surrounding the cell. This structure gives the cell a definite shape and support. It is not found in animal cells.
- Protoplasm is the organized contents of the cell, exclusive of the cell wall.
- Cytoplasm is the protoplasm of the cell, exclusive of the nucleus.
- Chloroplasts are the green, spherical organelles often seen moving within the cytoplasm. These organelles carry the pigment chlorophyll that is involved in photosynthesis. As the microscope light heats up the cells, the chloroplasts may begin to move quite rapidly in a process called cytoplasmic streaming, or cyclosis.
- The nucleus is the usually spherical, transparent organelle within the cytoplasm. This structure controls cell metabolism and division.
- The vacuole is a membrane-bound sac within the cytoplasm that is filled with water and dissolved substances. This structure serves to store metabolic wastes and gives the cell support by means of turgor pressure. Animal cells also have vacuoles, but they are not as large and conspicuous as those found in plants.

In the diagram to the right, draw several elodea cells. Label each of the bulleted parts listed above. It may be difficult to view some of the parts, much less draw them, so a diagram is available for your use in class.



Magnification _____ Verified _____

Length of one elodea cell. _____ Show your calculations in the space below:

What three structures observed in Elodea are unique to plants? _____, _____, _____

Animal Cells:

Multicellular heterotrophic organisms that ingest organic matter are in the animal kingdom. Animals are composed of cells that can be categorized into four major tissue groups: epithelial, connective, muscle, and nervous tissue. In this lab study, you will examine epithelial cells. Similar to the epidermal cells of plants, epithelial cells occur on the outside of animals and serve to protect the animal from water loss, mechanical injury, and foreign invaders. In addition, epithelial cells line interior cavities and ducts in animals. Examine the epithelial cells that form the lining of your inner check. To obtain a specimen, follow this procedure:

a. With a clean toothpick, gently scrape the inside of your check several times.

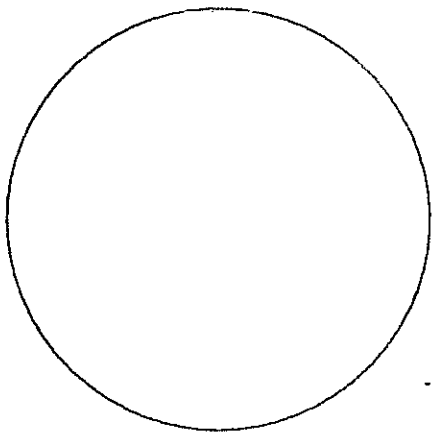
b. Roll the scraping into a drop of water on a clean microscope slide, add a small drop of methylene blue, and cover with a coverslip.

c. Using the compound microscope, view the cells under higher powers.

Observe that these cells are extremely flat and so may be folded over on themselves. Attempt to locate several cells that are not badly folded and study their detail.

Identify the following structures:

- The cell membrane is the boundary that separates the cell from its surroundings.
- The nucleus is the large, circular organelle near the middle of the cell. Cytoplasm is the granular contents of the cell, exclusive of the nucleus.



In the diagram to the right, draw several epithelial cells and label the parts bulleted above. Estimate the size of one epithelial cell (show your calculations.

Magnification _____ Verified _____
Calculations: