

1-8

What are the parts of a microscope?

Objective ▶ Identify and describe the functions of the parts of a compound microscope.

The Compound Microscope The first compound microscope was invented about 1590 by two Dutch lens makers, Hans and Zacharias Jansen. Many scientists made and used them. Much of what is known about living things would not be possible without the microscope.

All compound microscopes have the same basic parts. Using a microscope can be a lot of fun. It is easy to use if you know its parts and what they do.

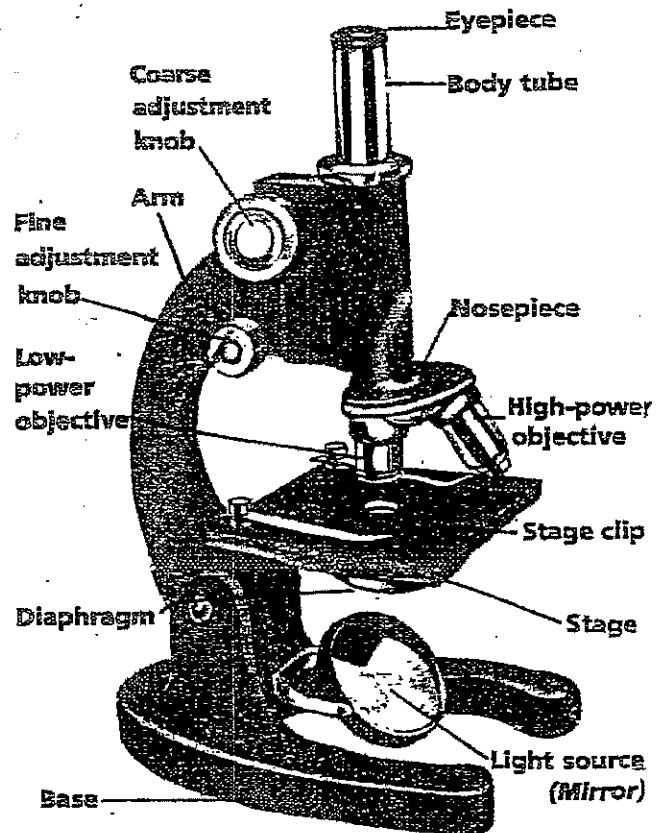
▶ **Identify:** Who invented the first compound microscope? Hans and Zacharias Janssen

Parts of the Compound Microscope As you read about each part of the compound microscope, find the part on the drawing.

- ▶ **Eyeiece** The eyeiece is located at the top of the microscope. It holds the ocular lens.
- ▶ **Body tube** The body tube is a hollow tube through which light passes. It holds the lenses apart.
- ▶ **Nosepiece** The nosepiece holds the objective lenses.
- ▶ **Objective lens** There are several objective lenses. Each lens has a different magnification power.
- ▶ **Arm** The arm supports the body tube, and is used to carry the microscope.
- ▶ **Coarse-adjustment knob** This knob turns and is used to raise or lower the body tube to focus the microscope.
- ▶ **Fine-adjustment knob** The knob also raises or lowers the body tube. It is used to bring objects into sharp focus.
- ▶ **Stage** The stage is the place where the object you are looking at is put.

- ▶ **Stage clips** The stage clips hold down the slide on the stage.
- ▶ **Diaphragm** The diaphragm (DY-uh-fram) changes the amount of light entering the body tube.
- ▶ **Light source** The light source is located beneath the diaphragm. It sends light toward the hole in the stage. A light source can be an electric light built into the microscope or a mirror that reflects light into the microscope.
- ▶ **Base** The base is the bottom part of the microscope. It often is shaped like a horse-shoe. With the one hand holding the arm and one hand under the base, you carry a microscope properly.

▶ **Describe:** How do you carry a microscope properly? One hand holding the arm; other hand under the base



LESSON SUMMARY

Use the reading on the *Parts of the Compound Microscope* to answer the following:

1. The lens at the top of the microscope is located in the _____.
2. When looking through a microscope the _____ lens is closest to your eye.
3. The nosepiece holds the _____ lenses.
4. The coarse and fine adjustment knobs help to _____ the microscope.
5. The object to be viewed is placed on the _____ of the microscope.
6. The amount of light entering the microscope is controlled by the _____.

Apply:

7. Explain: Why is a compound microscope also called a light microscope?

8. Infer: Why do you think it is more important to get a clearer image than one that is fuzzy but greatly magnified?

9. Infer: How does changing the objective lens to a higher power affect the image seen through the microscope?

Find the magnification of the microscopes below:

To find magnification multiply the magnification of the ocular lens by the magnification found on the objective lens.

	Ocular Lens (Eyepiece)	Objective Lens	Magnification
a.	5X	10X	
b.	10X	10X	
c.	10X	40X	
d.	5X	20X	

Question: How do animal and plant cells differ?

Skills: *observe, compare, and use a microscope*

Materials:



- Light microscope
- 2 glass slides / coverslips
- Dropper / water
- Methylene blue stain
- Toothpick - flat type
- Elodea leaf

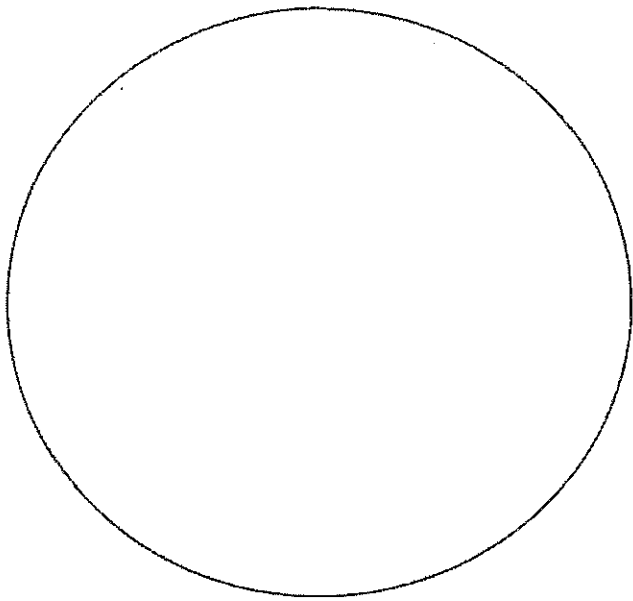
Procedure:

1. Prepare a slide of an *Elodea* leaf. Put an *Elodea* leaf in a drop of water on a slide and add a coverslip.
2. Center the leaf in the viewing area. Focus *Elodea* leaf at low power (40X).
3. Change objective lens to medium power (100X) and focus image again. Locate the cell wall, chloroplasts, and cytoplasm.
4. Draw and label cell wall, chloroplasts, and cytoplasm of *Elodea* leaf at medium power (100X).
5. Change objective lens to high power (400X) and **using only fine adjustment knob** focus image again. Locate the cell wall, cell membrane, chloroplasts, nucleus, and cytoplasm. Fill in the table.
6. Draw and label cell wall, cell membrane, chloroplasts, nucleus, and cytoplasm of *Elodea* leaf at high power (400X).
7. Put a drop of stain on a slide. Gently rub the flat side of the toothpick on the inside of your cheek and stir the toothpick into stain.
CAUTION: Do not rub hard enough to injure your cheek.

Place check marks next to cell parts seen in each cell type.

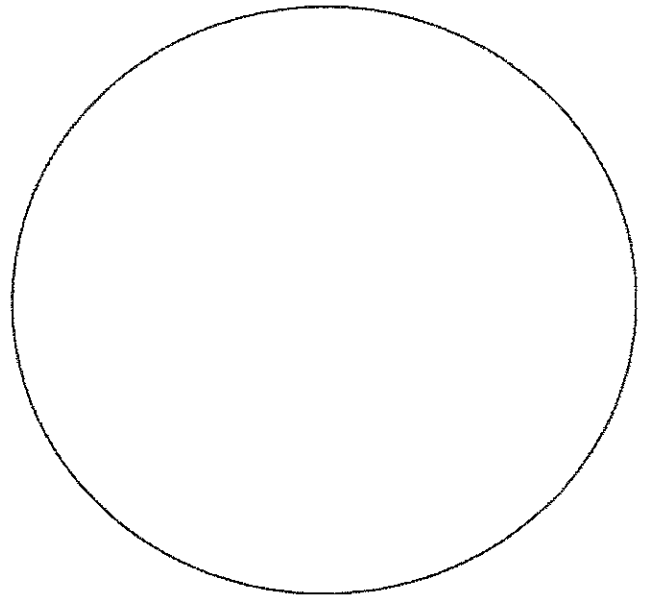
Cell Part	Elodea Cell	Cheek Cell
Cytoplasm		
Nucleus		
Chloroplasts		
Cell Wall		
Cell Membrane		

8. After stirring toothpick in the stain, immediately discard the toothpick and cover slide with a cover slip.
9. Focus on cheek cells at low power (40X) and center a cluster of cells in the viewing area.
10. Change objective lens to medium power (100X) and focus image again. Locate the cell membrane, nucleus, and cytoplasm.
11. Draw and label cell membrane, nucleus, and cytoplasm of cheek cells at medium power (100X).
12. Change objective lens to high power (400X) and **using only fine adjustment knob** focus image again. Locate the cell membrane, nucleus, and cytoplasm. Fill in the table.
13. Draw and label cell membrane, nucleus, and cytoplasm of cheek cell at high power (400X).



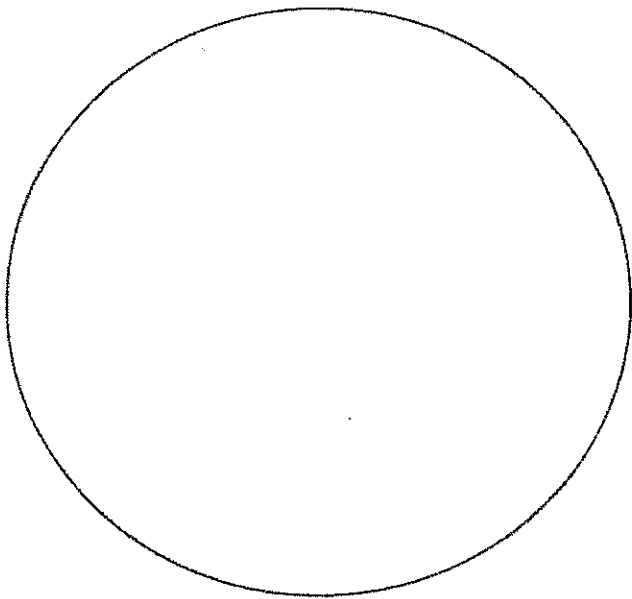
Magnification: _____

Subject: _____



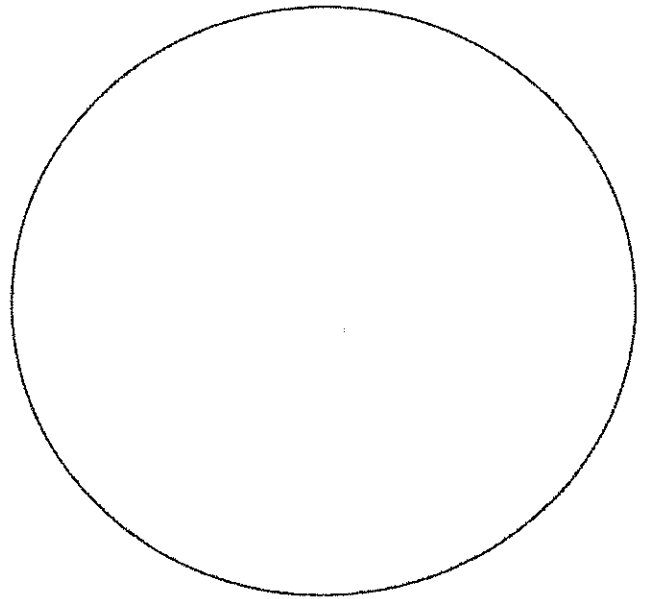
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Magnification: _____

Subject: _____



Magnification: _____

Subject: _____

Observation and Analysis:

1. Describe the shape of the cheek cell.

2. Describe the shape of an *Elodea* cell.

3. What cell parts did you see in both plant and animal cells?

4. What cell parts were seen in plant cells but not in animal cells?

5. What are the functions of those cell parts found only in plant cells?

6. Is the nucleus always seen in the center of a cell?

7. Which part of an animal cell gives shape to the cell?

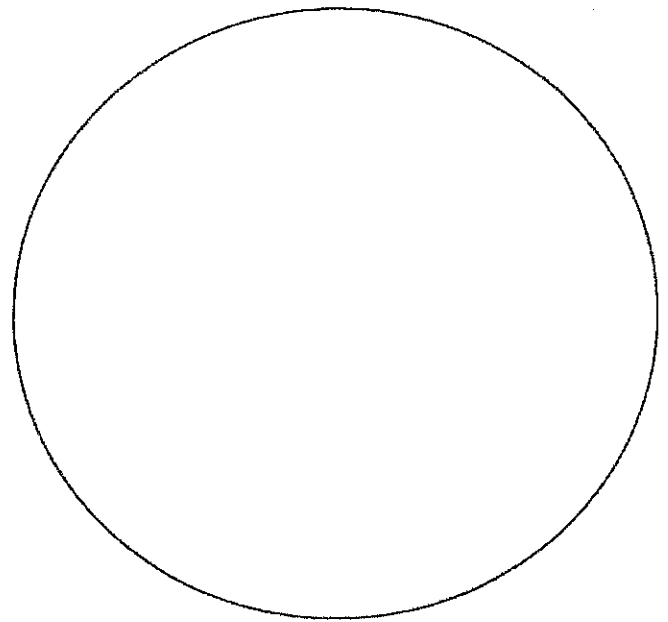
8. Why is a stain, methylene blue, used on the animal cells?

9. Why don't animal cells have chloroplasts? (Hint: How do animals get energy?)

10. Compare and contrast the compound microscope to the stereomicroscope.

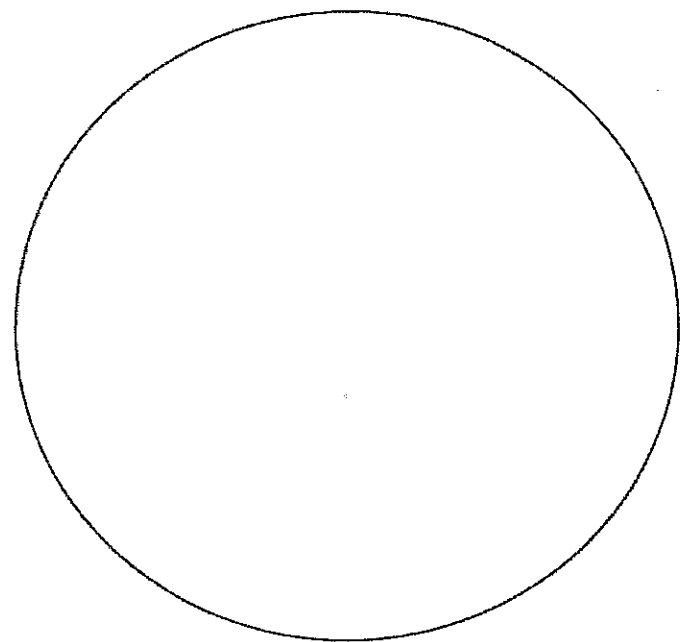
Extension:

Observe a protozoan with the microscope. Draw and label visible cell parts. Describe how the protozoans are like the plant and animal cells. Describe how they are different.



Magnification Used _____

Observe at least one other cell type using prepared slides. Draw and label visible cell parts. Describe how this cell type is different from cells already observed.



Magnification Used _____