

BASIC UNIT OF LIFE

FOR EACH OF THE CELLS LISTED IN THE LAB - LOOK FOR THEIR IMAGES ON LINE,
OR SEE THE SUPPLEMENTAL "Cell Specimen Pictures" ON MY "LAB" PAGE BELOW THIS
DOCUMENT

FILL IN THE SPACES FOR EACH TYPE OF CELL WITH A SKETCH OF WHAT YOU FIND.
BE SURE TO INCLUDE THE MAGNIFICATION AND LABEL THE STRUCTURES AS DIRECTED
IN THE LAB.

THE BAMBOO STEM CELLS HAVE BEEN SKETCHED FOR YOU.

When different types of cells are viewed under a microscope, different cell parts can be seen. Certain living cells are best for showing parts like a nucleus or cell membrane. Once living (preserved) cells are best for showing parts like a cell wall. Cells from producer organisms (plants) will show parts such as chloroplasts and cell walls. Most consumer organism cells do not have these parts, although fungi have cell walls. We will not consider fungi in this investigation.

In this investigation, you will

- observe a variety of living and once living materials under the microscope.
- determine if these materials do or do not show a cellular type of organization.
- study and locate under the microscope six specific cell parts—cell wall, cell membrane, cytoplasm, nucleus, nucleolus and chloroplasts.
- compare the cell parts found in plant and animal cells.

Materials

microscope
microscope slides
coverslips
water
cork
razor blade (single-edge)
iodine stain
toothpicks
dropper
saxophone reed
methylene blue stain
onion bulb
Elodea (water plant)
frog blood, prepared slide

Procedure

Part A. The Cell Wall

Cork cells are excellent for studying a cell part common to all plant cells. This part is the cell wall. In a cork cell, the cell wall is easily visible. The cork is no longer living. The cell wall remains as the only evidence of once living materials.

● Use a razor blade to slice off a very thin section of cork using Figure 12-1 as a guide. Note that the slice should be made from the side of the cork, not its top or bottom. The slice must be tissue paper thin. Shavings of cork are ideal size. **CAUTION:** *Slice away from your fingers, not toward them, to avoid cuts.*

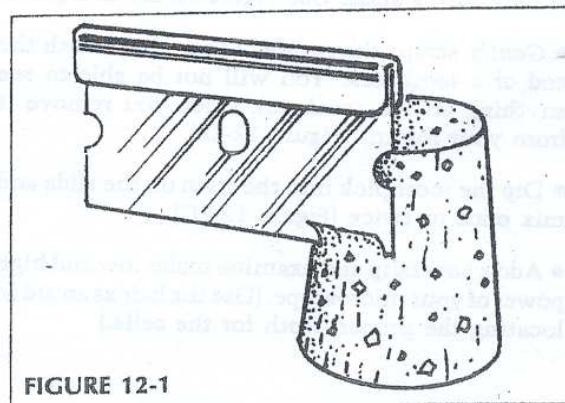
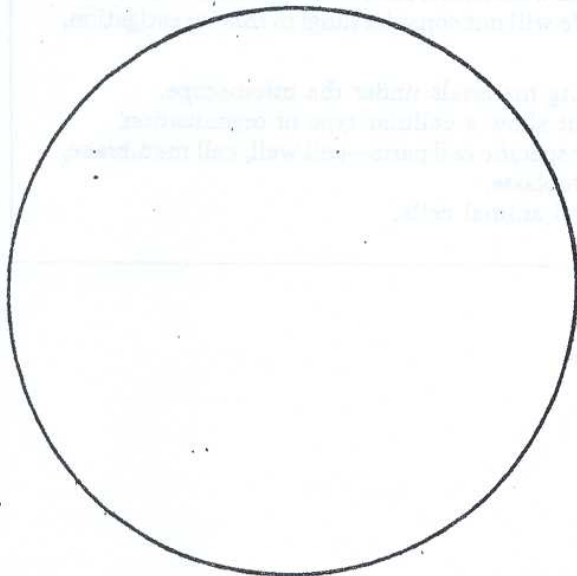


FIGURE 12-1

- Prepare a wet mount of your cork slice.
- Examine the cork under low power and then high power of your microscope. Use the fine adjustment to obtain a three-dimensional view of the cells.
- Use the space below to draw several cork cells as they appear under high magnification. Label *cell wall*.



cork cells

FIGURE 12-2

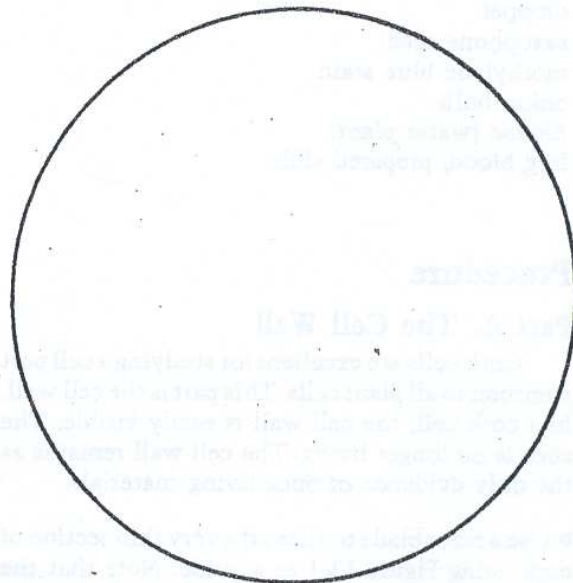


- Locate and examine cells that are separated from one another rather than those that are in clumps.
- Use the space below to draw several cheek cells as they appear under high magnification. Label the *cell membrane* and *cytoplasm*.

Part B. Cell Membrane and Cytoplasm

Human cheek cells may be used for viewing the cell membrane and cytoplasm. A cell membrane is a thin outer boundary which surrounds the cell and separates it from neighboring cells. Cytoplasm is the jellylike inner portion of the cell.

- Place a drop of methylene blue stain and a strand of hair onto a slide. Use Figure 12-2A as a guide.
- Gently scrape the *inside* of your cheek with the end of a toothpick. You will not be able to see anything on the toothpick when you remove it from your mouth (Figure 12-2B).
- Dip the toothpick into the stain on the slide and mix once or twice (Figure 12-2C).
- Add a coverslip and examine under low and high power of your microscope. (Use the hair as an aid in locating the proper depth for the cells.)



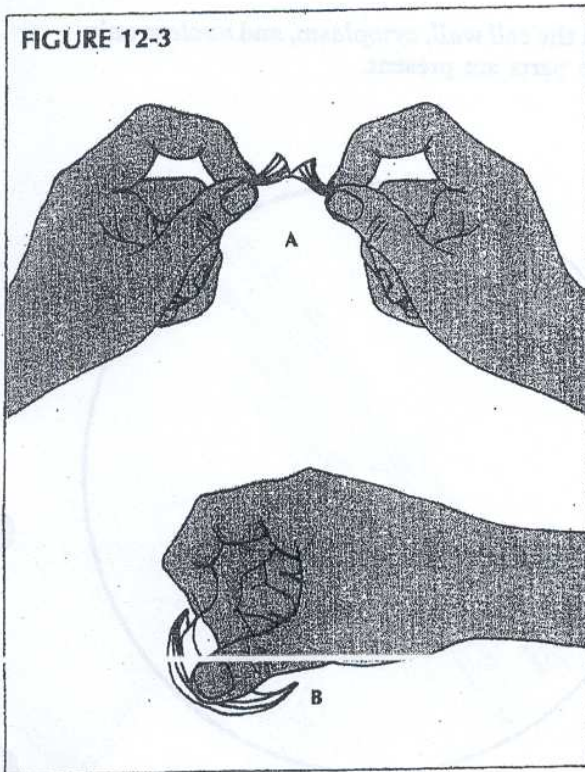
cheek cells

Part C. Cell Nucleus and Nucleolus

Onion cells may be used to show a cell's nucleus and nucleolus. These two structures appear within most living cells. There may be several nucleoli (plural of nucleolus) appearing as tiny dots within each cell's nucleus. The nucleus will appear as a round structure inside each cell.

Follow these steps in preparing onion cells for your wet mount:

- Snap an onion bulb scale (part of the onion you eat) in half (Figure 12-3A).
- Use your fingernail to peel off a thin layer of onion tissue (Figure 12-3B).
- Place one thin onion layer onto a microscope slide.
- Uncurl or unfold any overlapped portion of the cell layer. Make sure the layer is perfectly flat. Add a drop or two of iodine stain to the onion. **CAUTION: If iodine spillage occurs, rinse with water and call your teacher immediately.** Add a coverslip to the stained onion. Tap the coverslip gently with the eraser end of a pencil to drive out any air bubbles.



- Observe the cells under both low and high power of your microscope. Note the brick wall appearance of the cells with cell walls separating the cells.

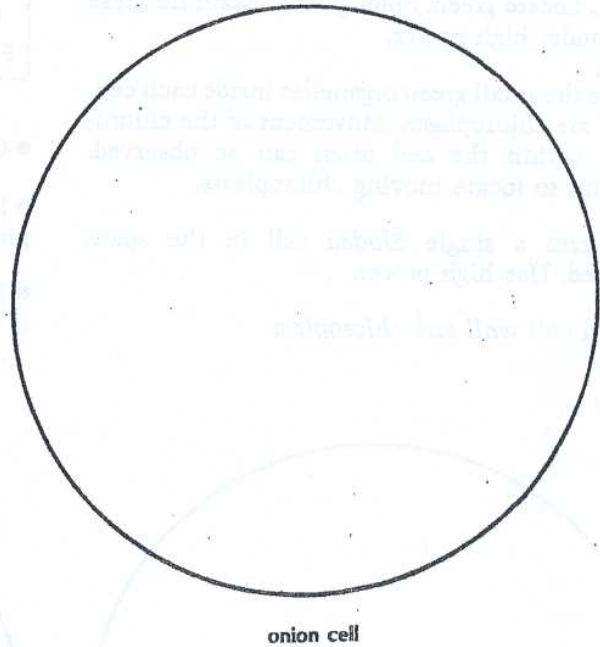
- Locate a small round structure, the nucleus, within each cell. Examine a nucleus carefully by focusing up and down through the cell.

- With high power, observe the tiny dots or eyelike structures within the nucleus. These are nucleoli.

The outer edge of the nucleus is made up of a thin covering called the nuclear membrane.

- Diagram a single onion cell in the space provided as it appears under high power.

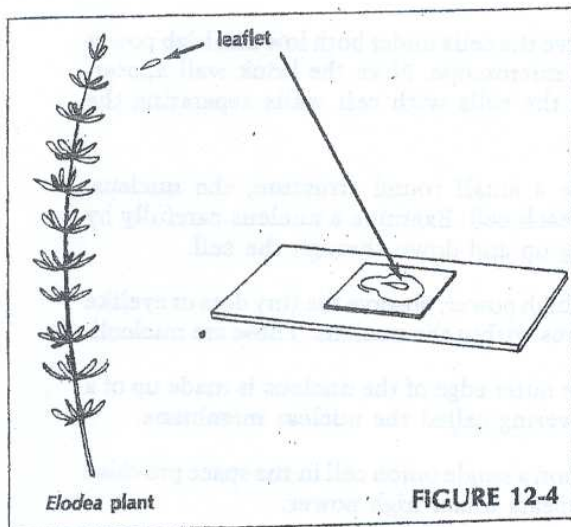
- Label the *cell wall*, *nucleus*, *nucleolus*, and *nuclear membrane*.



Part D. Chloroplasts

Another cell part found in the cells of many producers is the green chloroplast. *Elodea*, a common water plant, shows these important structures well.

- Prepare a wet mount of an *Elodea* leaflet. Use Figure 12-4 as a guide.

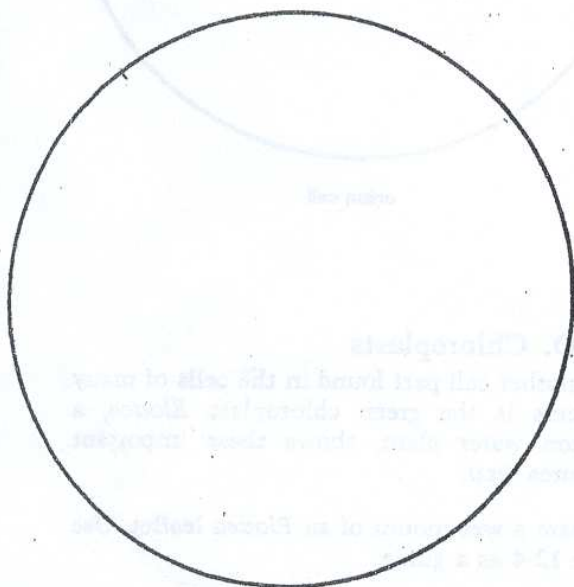


● Using low power of your microscope, position your slide so you are looking near the edge of the leaflet. Locate green, oblong cells. Examine these cells under high power.

● Note the small green organelles inside each cell. These are chloroplasts. Movement of the chloroplasts within the cell often can be observed. Attempt to locate moving chloroplasts.

● Diagram a single *Elodea* cell in the space provided. Use high power.

● Label *cell wall* and *chloroplast*.



Elodea cell

Part E. Plant or Animal Cell?

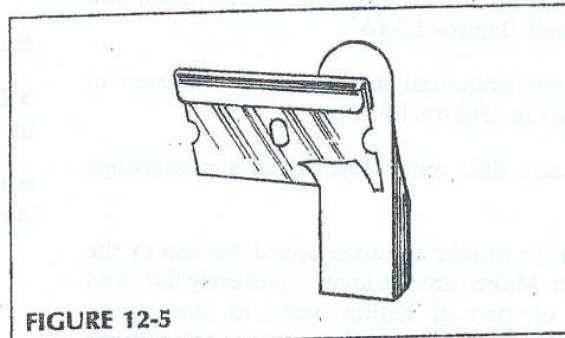
Bamboo Stem

● Prepare a wet mount of bamboo stem cells by using the following steps:

(a) Hold a razor blade against the flat side of a reed (Figure 12-5).

(b) Carefully cut away from your fingers and remove as thin a slice as possible from the reed.

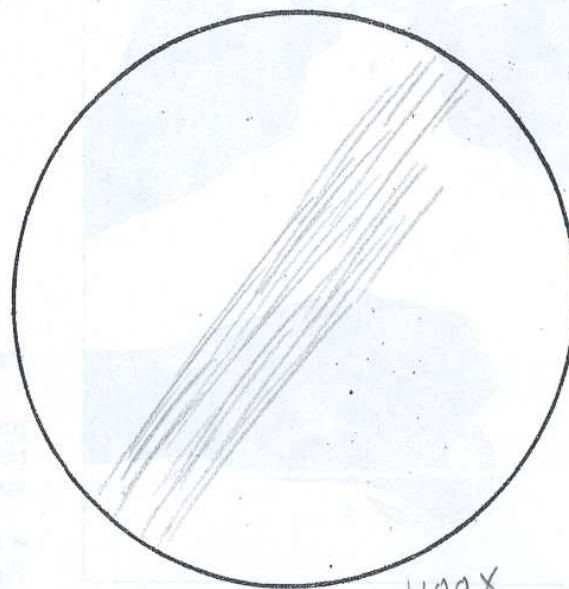
(c) Place this thin slice on a slide in a drop of water. Add a coverslip.



● Observe the bamboo stem under low power.

● Diagram several bamboo cells in the space provided.

● Label the *cell wall*, *cytoplasm*, and *nucleus* only if these parts are present.



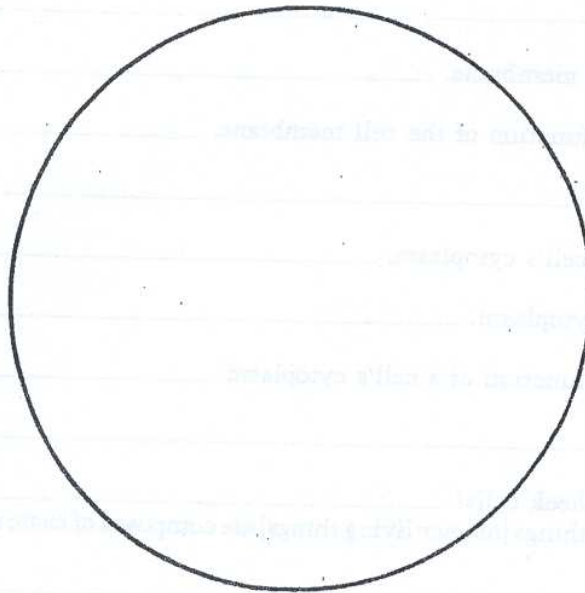
bamboo cells

Frog Blood

● Observe a prepared slide of frog blood. Use low and high power. The colors you see are not natural. Stains have been added to these cells to make viewing easier.

● Diagram several frog blood cells in the space provided. Use high power.

● Label the *cell wall*, *cell membrane*, *cytoplasm*, and *nucleus* only if these parts are present.



frog blood cells

Analysis

Analysis, Part A:

1. Is the cork you used alive? _____
2. What are the small units that can be seen under high power called? _____
3. Do these units appear filled or empty? _____
4. What specific cell part is all that remains of the cell? _____
5. In 1665, Robert Hooke, an English scientist, reported an interesting observation while looking through his microscope at cork. "I took a good clear piece of cork, and with a penknife sharpened as keen as a razor, I cut a piece of it off, then examining it with a microscope, me thought I could perceive it to appear a little porous, much like a honeycomb, but that the pores were not regular."
 - (a) What were the honeycomb units at which Hooke was looking? _____
 - (b) What specific cell part was all that was left of the cork? _____
6. (a) Is cork produced by a plant or an animal? _____
 - (b) Do animal cells have cell walls? (NOTE: See introduction.) _____
7. Use your text to determine the name of the chemical which makes up the cell wall. _____

Analysis, Part B:

1. Describe the shape of a cheek cell. _____
2. (a) Are cheek cells produced by plants or animals? _____
(b) Is a cell wall present? _____
3. Are cheek cells alive? _____
4. Describe the location of the cell membrane. _____
5. Use your text to determine the function of the cell membrane. _____

6. (a) Describe the location of the cell's cytoplasm. _____
(b) Describe the appearance of cytoplasm. _____
7. Use your text to determine the function of a cell's cytoplasm. _____

8. Why was a stain added to the cheek cells? _____
9. Do you have evidence that living things (or once living things) are composed of basic units called cells?
_____ Explain. _____

Analysis, Part C:

1. Describe the shape of an onion cell. _____
2. (a) Are onion cells produced by plants or animals? _____
(b) Is a cell wall present? _____
3. (a) Describe the shape of the nucleus of an onion cell. _____
(b) Within what cell part already studied does the nucleus lie? _____
4. What is the function of a cell's nucleus? (Consult text if necessary.) _____
5. (a) Describe the shape of the nucleolus of an onion cell. _____
(b) Where is the nucleolus found? _____
6. What is the function of a cell's nucleolus? (Consult your text if necessary.) _____

7. What structure separates the contents of the nucleus from the cytoplasm? _____
8. Why were the cells stained? _____

Analysis, Part D:

1. Describe the shape of an *Elodea* cell. _____
2. (a) Is elodea a plant or animal? _____
 (b) Is a cell wall present? _____
3. Describe the
 - (a) color of the chloroplasts. _____
 - (b) shape of the chloroplasts. _____
4. Within what cell part already studied do chloroplasts lie? _____
5. Use your text to determine the function of chloroplasts. _____
6. Are chloroplasts usually present in consumer cells? _____ Explain. _____

Analysis, Part E:

1. Describe the shape of bamboo cells. _____
2. (a) Can a cell wall be seen in bamboo? _____
 (b) Is bamboo a plant or animal? _____ Explain. _____

3. Describe the shape of frog blood cells. _____
4. (a) Can a cell wall be seen in frog blood cells? _____
 (b) Are blood cells from a producer or consumer? _____ Explain. _____

5. (a) What cell part name is used to describe the outer edge of a frog blood cell? _____

 (b) What cell part name is used to describe the dark center of a frog blood cell? _____

Analysis, General:

1. Complete this chart. Indicate by using check marks each structure contained in a plant or animal cell.

	NUCLEUS	CELL WALL	CYTOPLASM	NUCLEAR MEMBRANE	NUCLEOLUS	CHLOROPLASTS	CELL MEMBRANE
Animal Cell							
Plant Cell							

2. Complete Figure 12-6 of a "typical plant cell." Use your text to determine where the following plant cell parts are located: *vacuoles*, *mitochondria*, *Golgi bodies*, *endoplasmic reticulum*, *ribosomes*, and *lysosomes*. Draw these parts as they would appear under an electron microscope onto Figure 12-6 and correctly label them. Label these parts which are already drawn for you: *cell wall*, *cytoplasm*, *cell membrane*, *chloroplast*, *nucleus*, *nucleolus*.

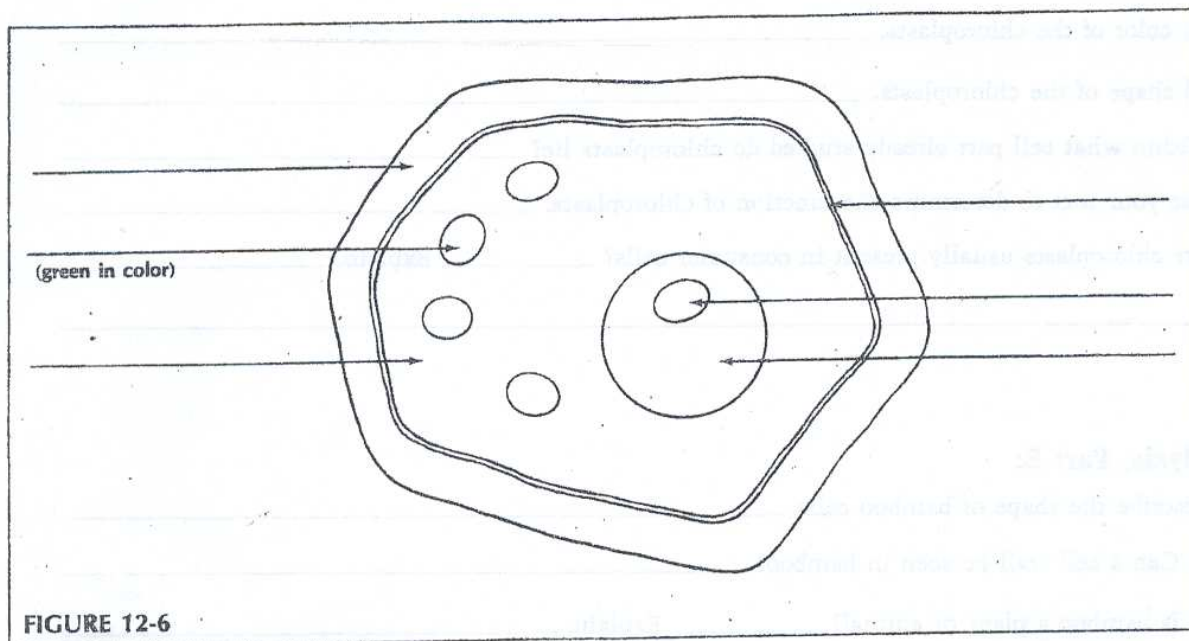


FIGURE 12-6

3. Complete Figure 12-7 of a "typical" animal cell. Label these parts which are already drawn for you: *cell membrane*, *nucleus*, *nucleolus*, *cytoplasm*. Use your text to determine where the following animal cell parts are located: *mitochondria*, *centrioles*, *Golgi bodies*, *endoplasmic reticulum*, *ribosomes*, and *lysosomes*. Draw these parts as they would appear under an electron microscope onto Figure 12-7 and correctly label them.

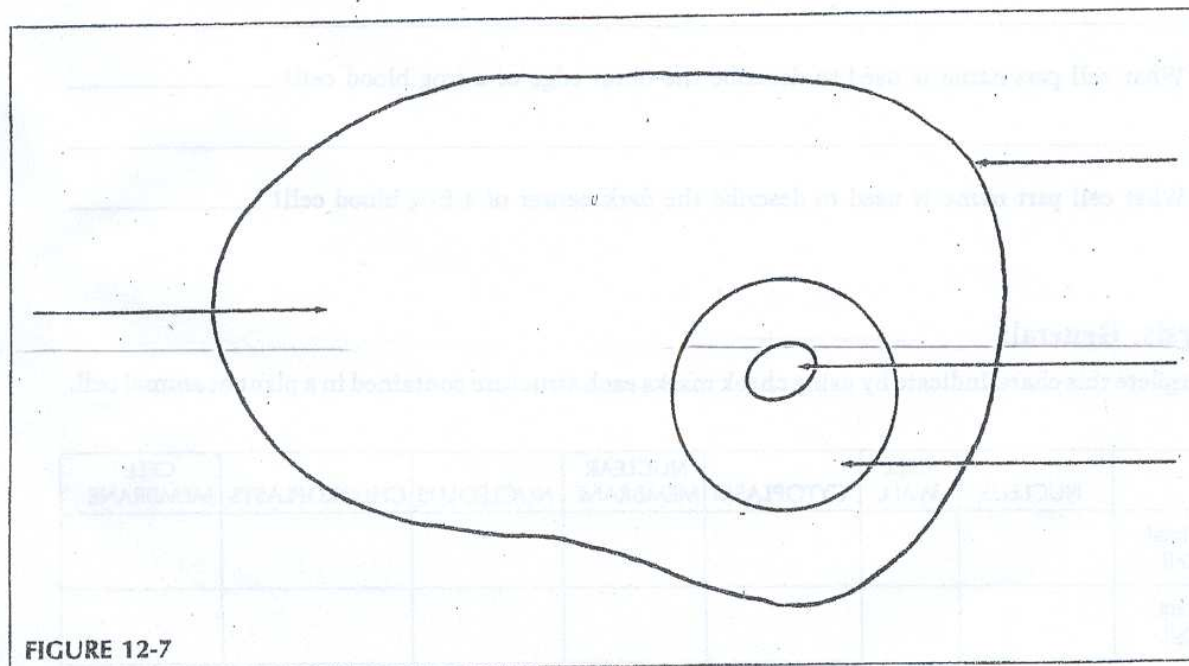


FIGURE 12-7