Experiment 1- Microscopy

1. What is the name of the program that is used to take digital photographs of organism seen in the microscope? _____.
2. What are the two types of microscopes used in the BIO1140 lab component? _____ and _____.
3. The _____ microscope is used to view items that are too large or too think.
4. The _____ supports the various objectives (4x, 10x, 40x).
5. The _____ supports the specimen being observed.
6. The _____ permits rapid change in distance between the specimen and the objective.
7. The _____ permits small changes in distance between the specimen and the objective.
8. The _____ is the piece with which one looks at the specimen.
9. The _____ is the magnifying element that is closest to the specimen.
10. The _____ is a system of lenses that concentrates the light furnished by the illuminator.
11. The _____ allows one to focus the concentrated light onto the specimen.
12. The _____ is used to reduce glare from unwanted light by adjusting the _____ of the cone of light that comes from the condenser.
13. The 40x on the objective engraving represents the _____.
14. The 0.95 located on the right of the 40x represents the _____.
15. The 160 / 0.17 below the above represents the _____.
16. If the ocular or objective is dirty, you use _____ to wipe them.
17. In a dissecting microscope, the letter “e” would look like ___ when viewed.
18. In a compound microscope, the letter “e” would look like ___ when viewed.
19. Working distance _____ as the magnification increases.
20. The depth of field _____ when magnification increases.
21. The other name for a dissecting microscope is a _____ microscope.
22. Dissecting microscopes can be used with two types of light: _____ and _____.

23. The _____ light is directed unto _____ specimens whereas the _____ light is directed unto _____ specimens.

24. Cells can be organized into two types: _____ and _____ cells.

25. _____ cells are much larger than _____ cells.

26. Linear chromosomes are seen in _____ cells, while circular chromosomes are seen in _____ cells.

27. The eukaryotic specimen used in this lab is named _____ and it is a _____ (plant or animal?)

28. _____ takes place in the chloroplasts of the *Elodea* leaf.

29. _____ is responsible for the green colour of the *Elodea.*

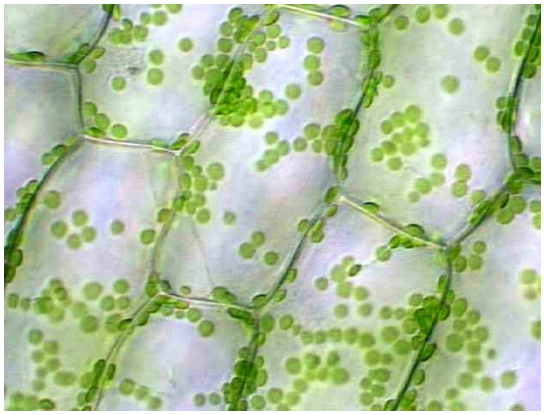
30. _____ is the directed flow of the cytosol and organelles around plant cells.

31. The _____ cannot be seen in plant cells under the microscope because it is too thin. To resolve this problem, _____ is added to the specimen, which removes the _____ from the plant, making the plasma membrane more visible. The organism that has the cell minus the cell wall is called a _____.

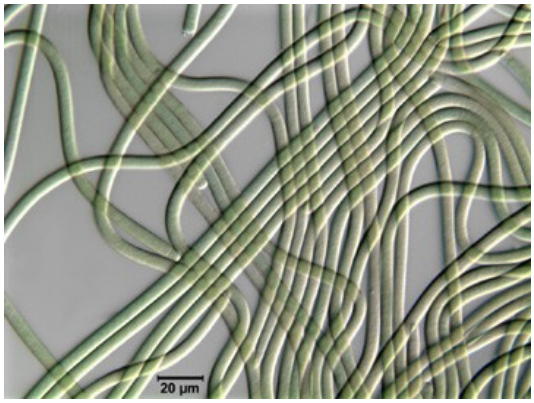
32. The prokaryotic cell used in this experiment is called _____.

33. The name of the shrimp larvae observed in this lab is _____, and 1-2 drops of _____ solution is used to slow down the larvae.

34. What is the name of the organism shown below? _____.



35. What is the name of the organism shown below? _____.

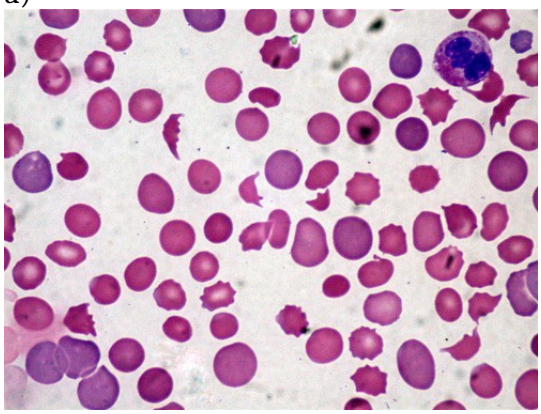


Experiment 2- Permeability of the Red Blood Cell

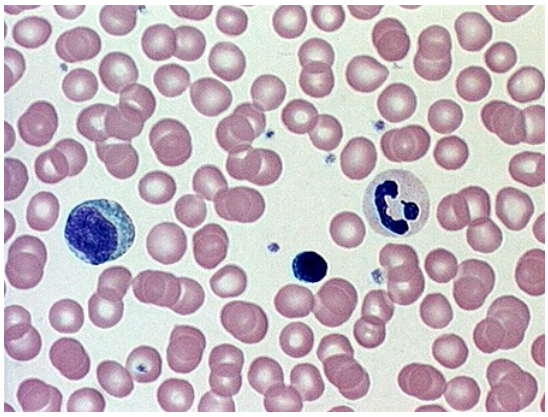
1. What is the scientific name of the red blood cells used in this experiment? _____.
2. These types of cells can be kept for a long time for 3-4 days in _____ or one week in _____.
3. Erythrocytes contain large quantities of the pigment _____.
4. When the volume of a cell exceeds a critical volume, the cell _____ and the pigment is released to the external environment; the phenomenon is called _____.

5. The movement of water across a semi-permeable membrane is called _____ and water moves freely across the membrane with the help of proteins called _____ that form canals through the membrane.
6. Water movements are driven by _____ which is the ability for water to move from the compartment with lower solute to higher solute.
7. The volume of a cell placed in a _____ solution will increase due to massive entry of water inside the cell.
8. Water flowing from the inside of the cell to the outside of the cell, causing the plasma membrane to shrink is therefore placed in a _____ solution.
9. When molecules in a solution cross the membrane *against* their own concentration gradient, _____ occurs.
10. Solutes can diffuse through a membrane at various different _____ depending on their functional groups.
11. Hemolysis occurs when erythrocytes are placed in a _____ environment.
12. A solution is called _____ if it has the same concentration of solutes as the cellular fluid.
13. When the suspension turns _____ and the line is clearly visible, you know hemolysis has been reached.
14. Adding 0.350 M of NaCl to blood will cause the cell to shrivel _____ (more/less?) than adding 0.065 M of NaCl.
15. Which of the following images below represents red blood cells undergoing hemolysis? _____.

a)



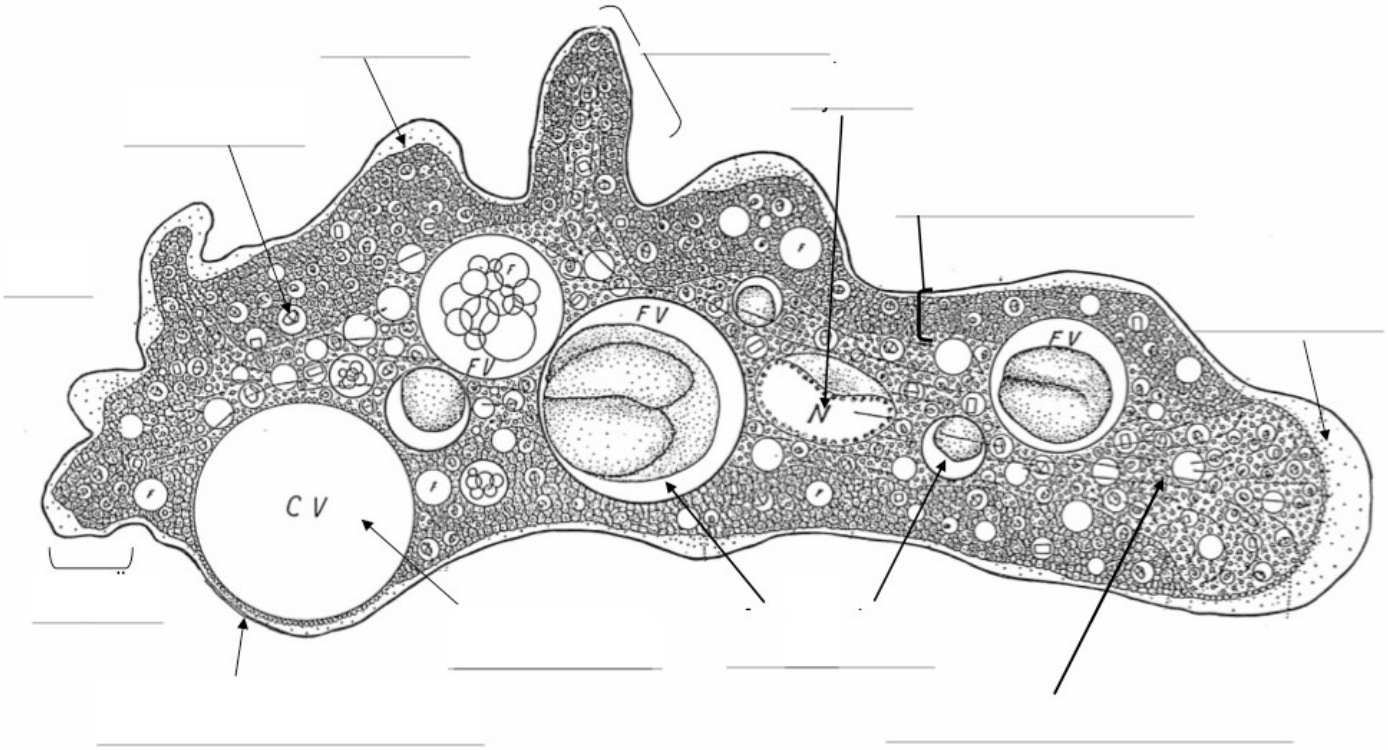
b)



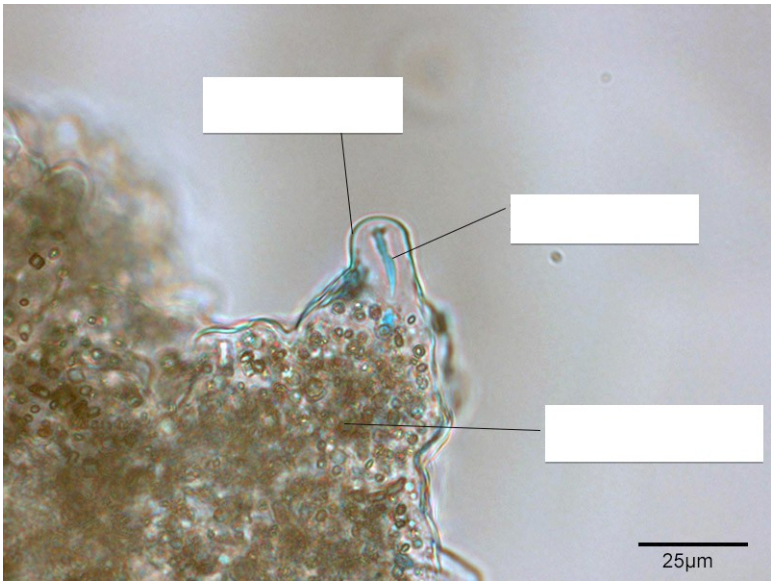
Experiment 3- Cellular Processes in *Amoeba proteus*

1. The objective of this experiment was to follow and measure the diameter of the _____ for the organism _____ under the microscope and take pictures of it.
2. The light on the compound microscope must be very _____(dim/bright?) when observing the *Amoeba proteus.*
3. The *Amoeba proteus* is a protist that belongs to the _____ group.
4. The *Amoeba proteus* is a _____ (single/multi?) celled(ular) organism that is a _____ (eukaryote/prokaryote?)
5. The *Amoeba proteus* is found in _____.
6. It extends its _____ as a way to move and catch food that will be later digested in food _____.
7. The name of the "fake feet" on the *Amoeba proteus* are called _____, which are made of extensions of long polymers of _____.

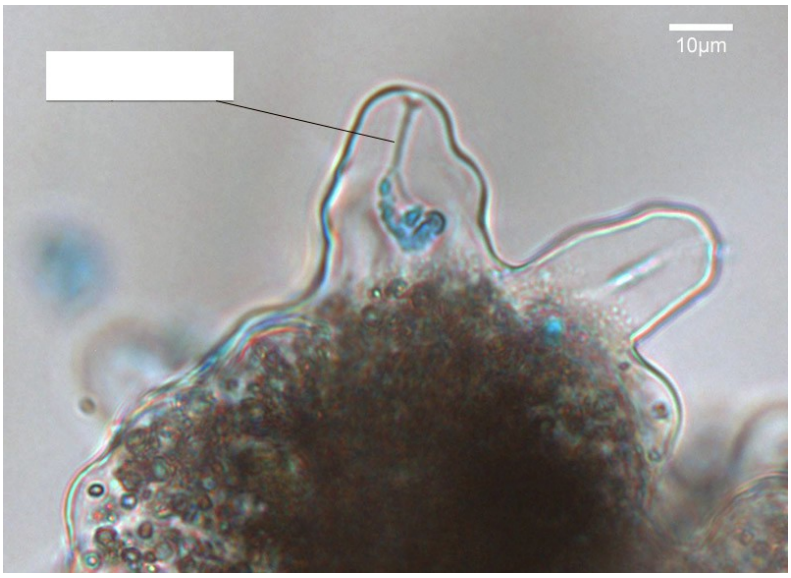
8. During the formation of a pseudopodium, molecules of free _____ bound to each other to create a series of long polymer fibers called _____.
9. The amoeba must constantly fight excess water entry by _____, and they release this excess water thanks to a _____.
10. The *Amoeba proteus* has how many contractile vacuoles? _____.
11. Time zero corresponds to the time when the amoeba _____ and this is specifically called _____.
12. A typical contractile vacuole cycle lasts for _____ minutes, but it may sometimes take longer.
13. _____ endocytosis may be induced by a large variety of substances such as _____.
14. A solution of _____ was used in this lab to induce pinocytosis.
15. Label the following parts of the image for *Amoeba proteus.*



16. Label the following parts.



17. Label the following parts.

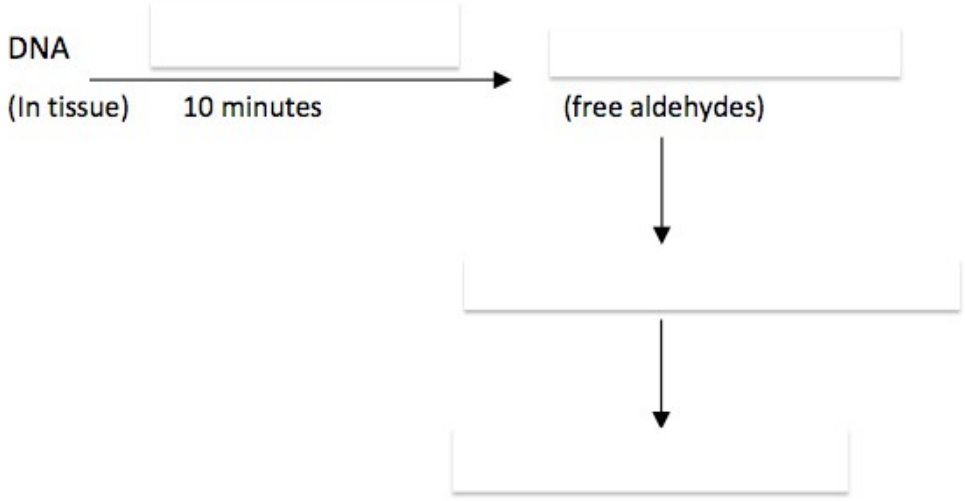


Experiment 4- Mitosis

1. All cells have a common fact, they all at one point _____.
2. The process that permits one cell to divide into two is called _____.
3. Cell division that will give rise to two daughter cells identical to the original mother cell is called _____.
4. The cell cycle can be broken down into two main parts: _____ + _____.
5. The M phase consists of _____ and _____.
6. Interphase consists of _____. (4 parts)
7. A cell spends most of its time in _____.
8. The _____ phase is where cells grow before DNA replication
9. The _____ phase is when all DNA is replicated and synthesized into proteins.
10. The _____ phase is the period after DNA replicates and prepares for division. This is where production of structures needed for mitosis are made.
11. The _____ phase is where the cell cycle is at rest.
12. The duplicated chromosomes consist of two _____ joined together by protein complexes called _____.
13. _____ is the part of cell division where the chromosomes are equally distributed between two daughter nuclei.
14. The five main stages of mitosis are:
    a. _____
    b. _____
    c. _____
    d. _____
    e. _____
15. The division of the cytoplasm at the end is known as _____.
16. _____ is the stage that the cell is in between mitotic divisions. DNA replication occurs during this stage and all you see is the nucleus and heterochromatin.
17. _____ is the stage where the chromosomes shorten and thicken. The two centromeres separate and migrate towards the opposite poles of the cell.
18. _____ is the stage between prophase and metaphase, where the kinetochore forms.

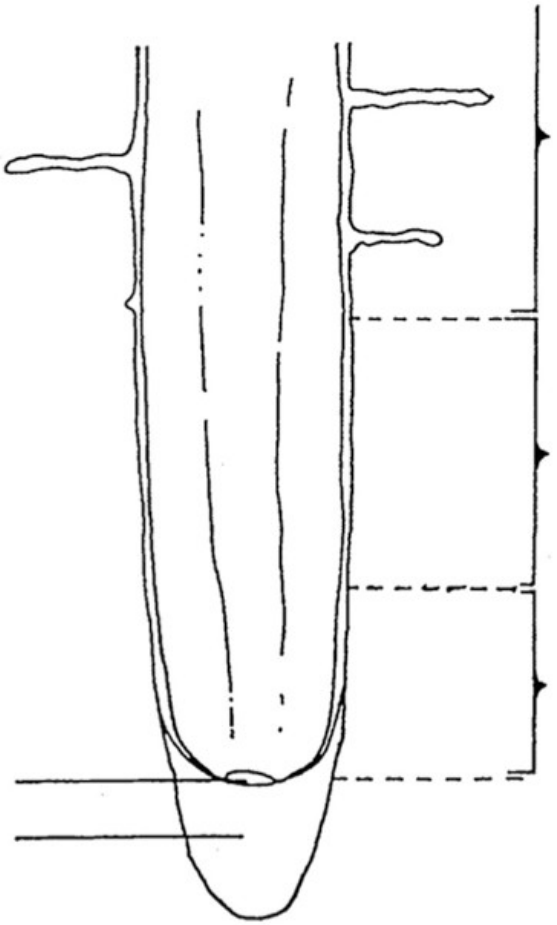
19. _____ is the stage where the centromeres start to separate and line up in the equator.
20. _____ is the stage where each chromatid move to the opposite poles of the cell.
21. _____ is the stage where the chromosomes become longer and thicker, and the nuclear membrane reforms. Also, _____ occurs during this phase where cell walls form around plant cells.
22. Mitosis is more easily seen in _____ cells because the chromosomes stand out more clearly.
23. The stain used for chromosomes is called the _____ stain. The stain colours the DNA _____.
24. The DNA is first hydrolyzed with hot _____ which removes the purine bases and frees the aldehyde groups of the sugar. The resulting product is called _____, aka DNA lacking purines. This is what reacts with the stain.
25. The timing of the acid hydrolysis is _____ minutes and this is very important because over hydrolyzing or under hydrolyzing will cause reduced staining.

26. Fill in the blanks.



27. The _____ is the inactive region where the cells are arrested in the G1 of interphase.
28. The _____ result in most of the increase in length of the root.
29. The _____ is the zone of cell division and apical growth.
30. The _____ is where most of the primary tissues mature.
31. The _____ cells transport water and salts from the soil to the rest of the plant.
32. The _____ cells transport carbohydrates from the photosynthetic portions of the plant to the roots.
33. The roots do not have _____ and cannot make their own food.

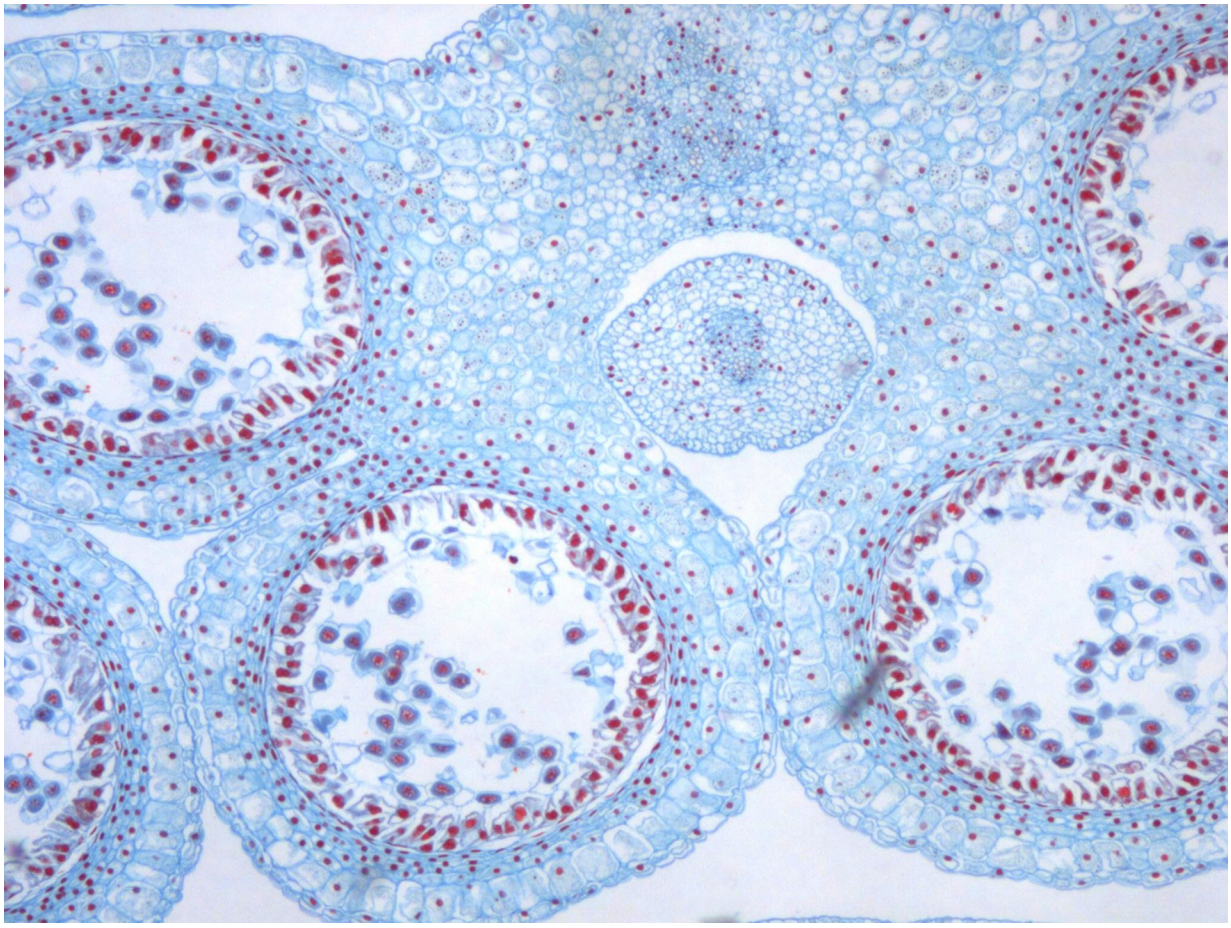
34. Label the longitudinal section of the root tip below.



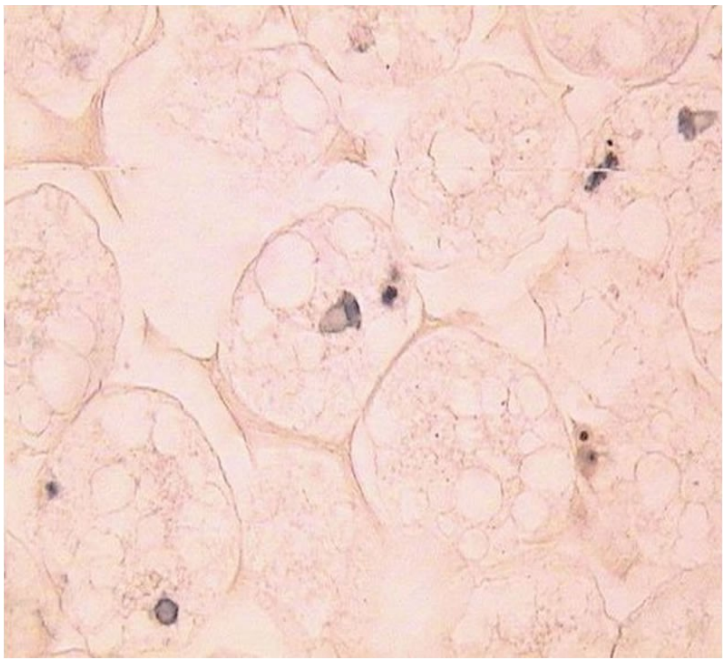
Experiment 5- Meiosis

1.) _____ was studied in the rat testes and _____ was studied in the rabbit ovary.

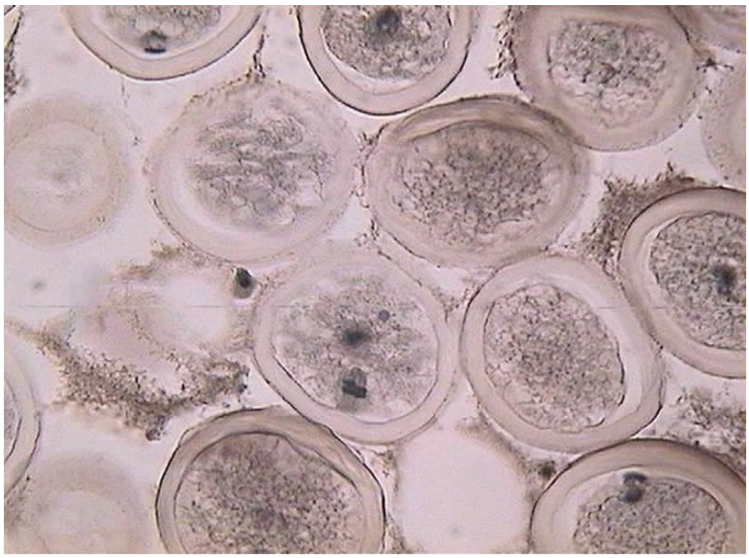
2.) Label the epidermis, filament, parenchyme, pollen cell precursor, and pollen sacs in the *Lilium* anther early prophase stage below.



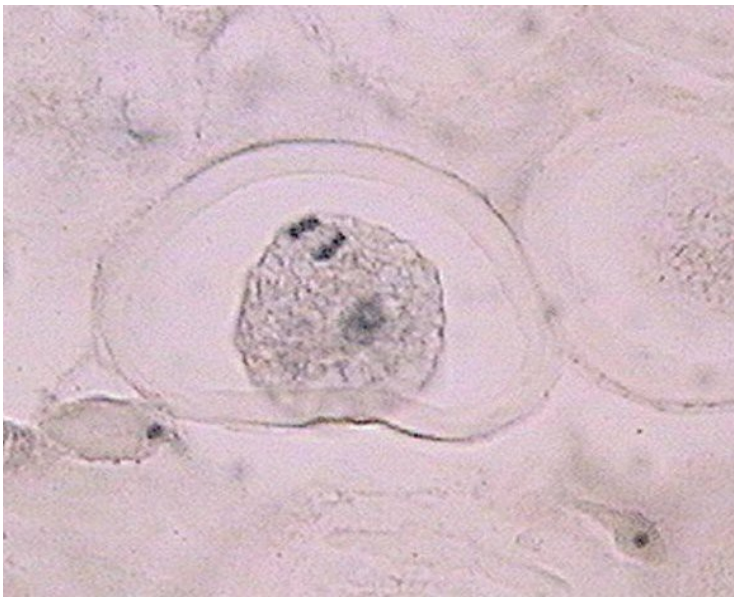
3. Label the spermatozoid and the egg nucleus in the diagram below.



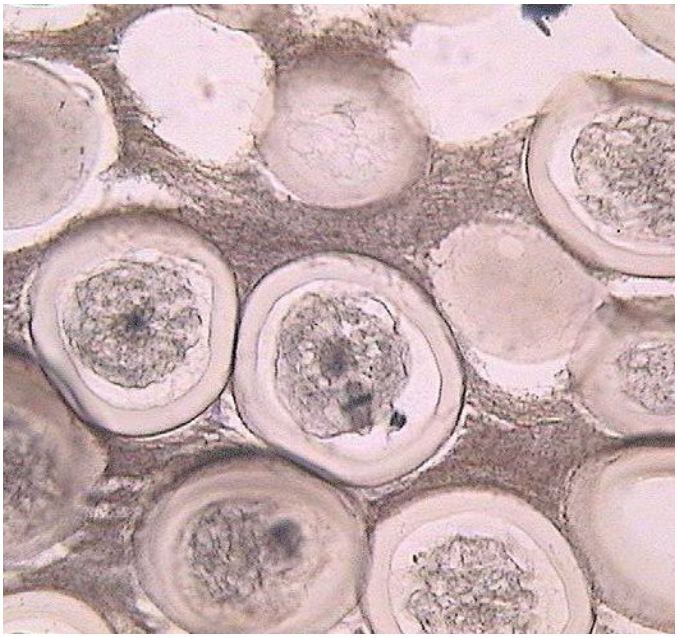
4. The stage of meiosis in the cell below is the _____ stage. Label the shell, chromosomes lined up at the equator, and pronucelus.



5. What stage is the cell in below? _____.



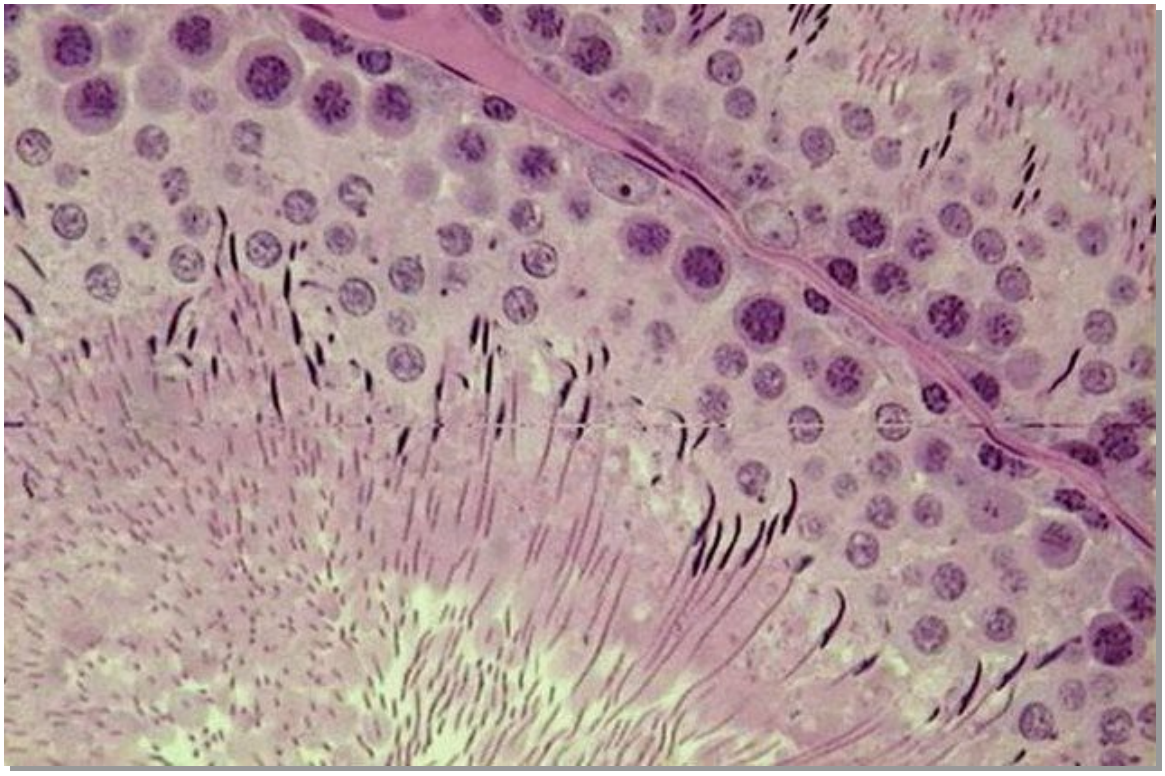
6. Label the polar body and perivitelline space in the image below. The stage this cell is in is _____.



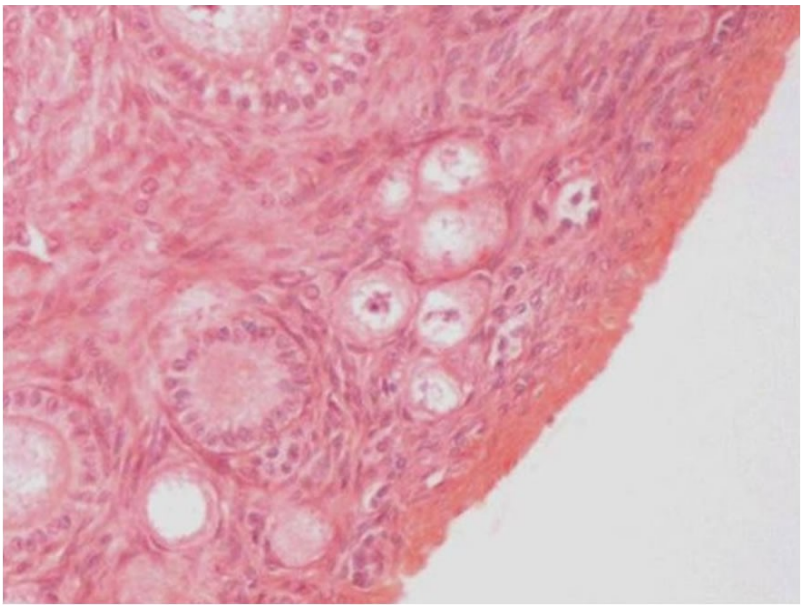
7. The stage that the cell is in below is _____.

8. Haploid male and female _____ in interphase prior to fusion is called _____. (image seen below)

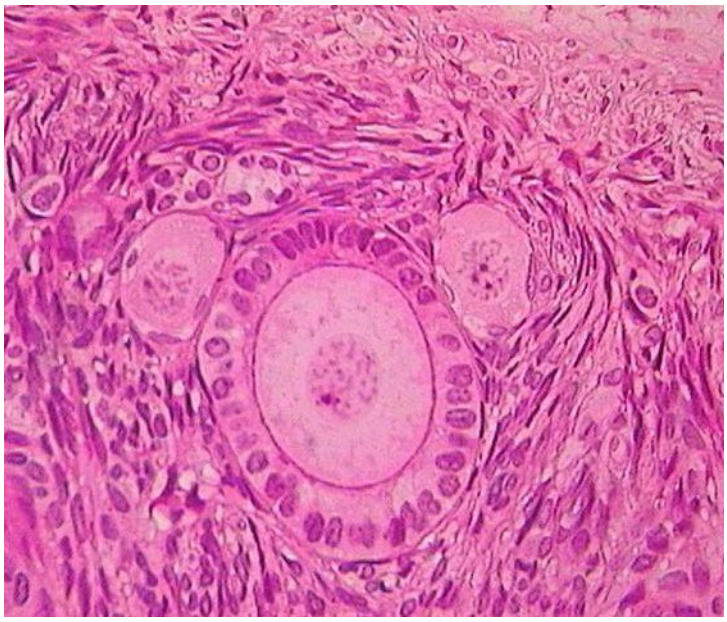
9. Label the basal lamina, sertoli cell nucleus, spermatogonia, primary spermatocyte, secondary spermatocyte, sperm cells, and spermatids in the cross section below.



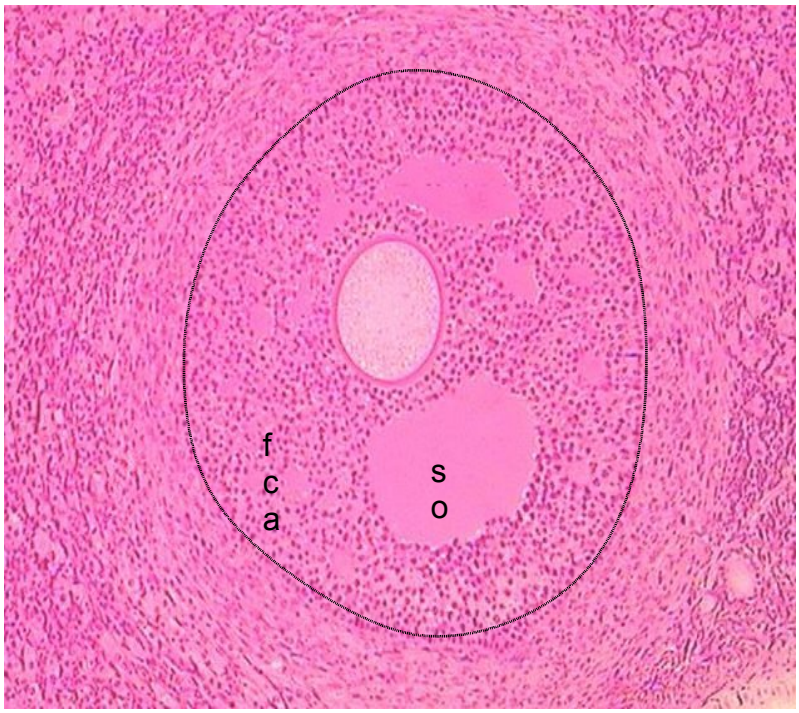
10. Label the primordial follicle, the ovary epithelium, and interstitial cells in the image below.



11. Label the cuboidal follicular cells, the primary oocyte, and the oocyte pronucelus in the rabbit ovary below.

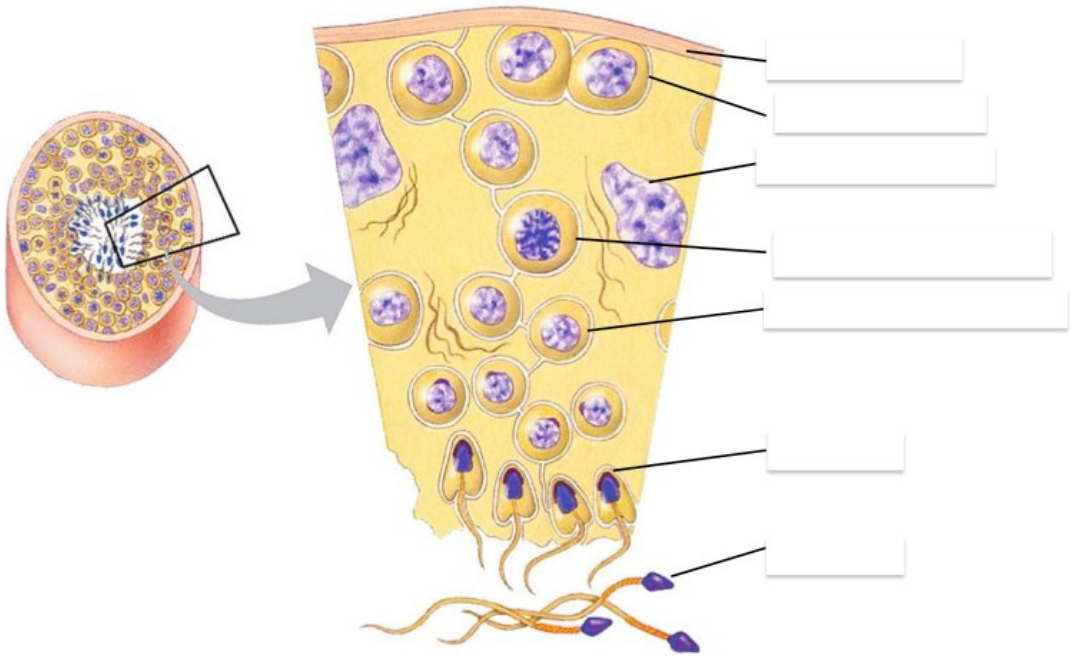


12. Label the fluid-filled cavity and the secondary oocyte in this image.



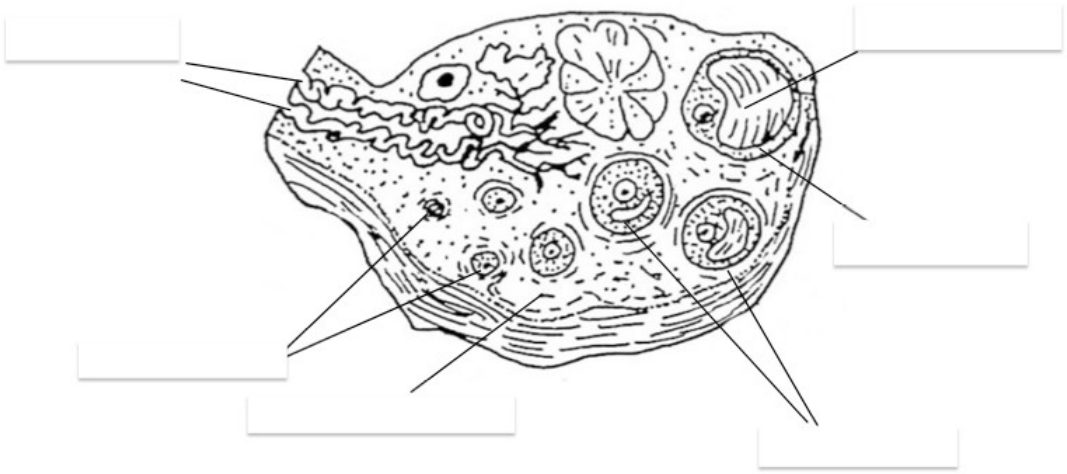
13. Is there DNA duplication in meiosis? _____.
14. The net result of meiosis is _____ cells, and the daughter cells are _____ to each other.
15. Each daughter cell contains only _____ chromosomes, half the number in the mother cell.
16. Meiosis only occurs in _____ reproducing organisms.
17. Sporophyte's form haploid _____, which divide to produce _____, which eventually produce gametes. Those gametes fuse to form diploid _____. This type of meiosis is called _____.
18. _____ precedes Meiosis 1 and is composed of G1, S and G2; the result of this stage is two _____ sister chromatids attached at the centromere.
19. RNA and proteins are synthesized in _____ stage.
20. The five sub-stages of Prophase 1 are:
    a. _____
    b. _____
    c. _____
    d. _____
    e. _____

21. At the beginning of _____, the nuclear membrane breaks down and the homologues line up on the equator. The two sister chromatids attach their _____ via microtubules to the same spindle pole.
22. In _____, the homologues are pulled away from each other toward opposite poles.
23. In Telophase 1, the spindle breaks down and the _____ reforms.
24. During the interphase like stage called _____ between meiosis 1 and meiosis 2, does DNA replication occur? _____.
25. The product after meiosis 2 is _____ haploid cells.
26. The name for a flowing plant is an _____.
27. The lily examined in this experiment was called _____.
28. What is the proper name for the formation of male gametes? _____.
29. _____ sperm are produced from each pair or meiotic divisions.
30. In the female _____, the whole cytoplasm and stored food must be retained in the egg for the use of the developing embryo.
31. While the large cell is the egg, the small one is called a _____.
32. One of the earliest studies of meiosis on egg formation was done in the parasite roundworm _____.
33. As the spermatozoa reach the eggs in the oviduct, _____ (how many?) penetrates each egg.
34. The haploid egg and sperm nuclei remain in the interphase for a while, and they are called the male and female _____.
35. During what phase is the first polar body extruded from the secondary oocyte? _____. The second polar body? _____.
36. The oocyte floats in a fluid space called _____.
37. The process where haploid male and female pronuclei remain in interphase for a while and then fuse is called _____.
38. Label the cross section of the tubule below.



39. _____ are large cells found in the walls of the seminiferous tubules, and they fed and regulate the spermatids.
40. _____are easily recognized by their long thin flagellum.
41. _____ will differentiate into functional spermatozoa.
42. Ovaries of a newborn mammalian female already contain all the _____ she will ever need during her reproductive years.
43. Each oogonium is surrounded by a layer of _____ and together they constitute a _____.
44. _____ are small round structures that contain one oogonium within one layer of follicular cells.
45. _____ are larger follicles with a few layers of follicular cells. Each follicle contains a primary and secondary oocyte.
46. _____ are large follicles that are occupied by a clear fluid-filled cavity.

47. Label the cross section of a mammalian ovary below.



Appendix

1. Quantitative variables are placed along one axis only, in the _____ axis for vertical bar graphs.
2. _____ have quantitative scales along both axes.
3. _____ graphs are used when many data points (n>30) are available at constant intervals, in order to see trends or changes in a variable through time.
4. _____ are used to investigate the relationship between two different sets of data.
5. While the graph takes up 2/3 of the page, the bottom 1/3 should be used for the _____.
6. Only _____ tick marks can be placed per quantitative axis, but there is no limit in the qualitative axis.
7. If means are plotted, _____ bars must be indicated and be slightly less prominent than the data points.
8. For more than 2 symbols used, a _____ should be created. Less than 2 symbols can be described in the caption.
9. When underlying the genus and species, each must be underlined _____.
10. The caption is located _____(above/below?) the table body.
11. No _____ lines should be used when creating a table.
12. _____ may be used to explain an abbreviation, symbol or term in the caption, heading or body of the table.
13. The biological drawing should be located either in the center or slightly to the _____ of the page, and should take up about _____ the page.
14. Should a frame be present around your drawing? _____
15. Should there be shading, stippling and cross-hatching? _____
16. All labels should be located _____, not off to the side. If needed, a _____ can be used, which is a straight line.
17. No unlabeled structures should be shown, and a _____ bar should be presented in the bottom right corner of the diagram.
18. The caption should be located immediately _____ the drawing and begin with a figure number.
19. Abbreviations used on the drawing must be listed at the _____ of the caption alphabetically.