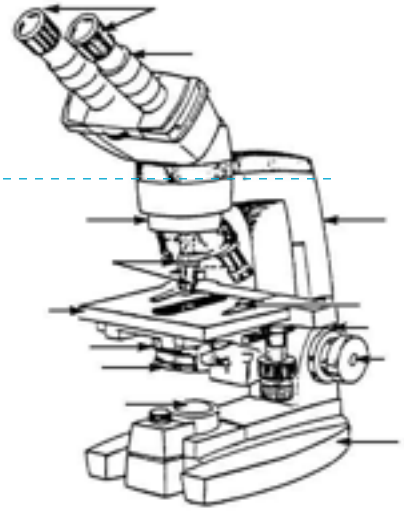
NAME: DATE: PERIOD:

Scopes Anatomy

Microscope it!

Microscope, Slide Preparation, and Cellular Discovery 101



Lab Objective

Microscopes help us to see parts of our world that for most of human history were a mystery! The first microscope was invented in 1590(ish) and led to development of Cell Theory. Today - right here, right now - we can look into the heart of life itself - the cell and see the history of life unfolded.

1. Identify and learn to use the various parts of the microscope with economy, ease and eventually mastery....whoooyeah!
2. Learn to focus and change objectives (zoom in) on prepared slides. Draw what you observe at the various magnifications.
3. Prepare your own wet mount slide and observe your mastery.
4. Finally - prepare, observe, measure, and document your own slides from the micro-world of your backyard and from *your face*!

Get to know a Scope!

Magnification: "Check your objective before you wreck your objective." Mr. Sapora

- The magnification written on the **ocular/eyepiece lens** (look at your drawing above) is _____
- The magnification written on the **scanning** objective is _____ **Low power** objective is _____ **High power** objective is _____
- What is the total magnification for each lens? (Think - multiply the ocular/eyepiece # by the objective # and this is how much bigger what you are looking at is).

Scanning _____ Low power _____ High power _____

Diaphragm: "The key to seeing is light...duh." Mr. Sapora

Turn the scope light on. With your scope firmly on the lab table - turn it slowly to where the front is facing you and your lab partners - stoop down and take a look at the diaphragm knob thingy - now move the knob thing - see how the light dims and brightens. This is **VERY** crucial! Thick objects need a lot of light in order to view them - while ***thin objects***, like strands of cotton or amoebas, are ***viewed better when the light is dim.***

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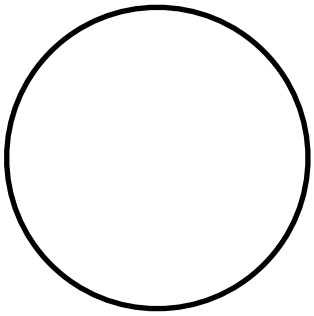
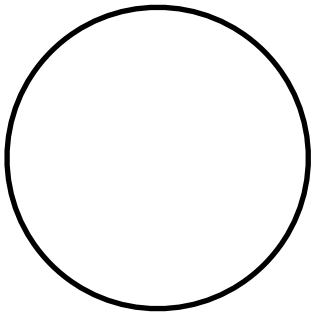
1. Viewing a Slide

1. Obtain a prepared **e** slide. Focus the slide first with the **scanning** objective, - be sure to place the **e** perfectly in the **center** of your viewing field. Next, click to the **low power** objective and focus and center again. Finally, click to the **high power** objective and focus using **only** the **fine adjustment knob**.
2. Draw the **e** exactly as it appears in your viewing field for **each** magnification. The circles below represent your viewing field. The **e** should take up as much space in the drawing as it does in your viewing field.

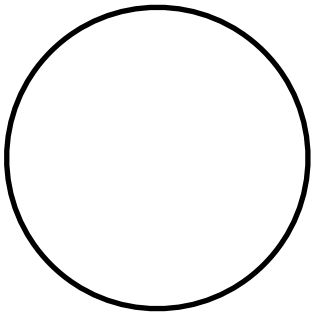
Scanning



Low Power



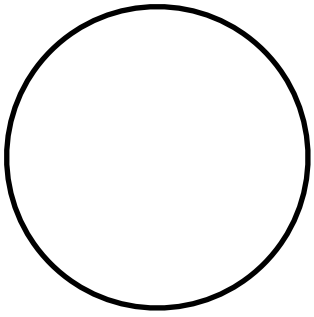
High Power



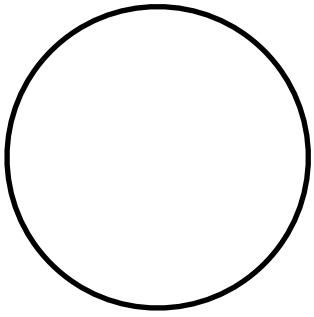
2. Making a Wet Mount Slide

1. **Tweezer up** just a few strands of **cotton** and place it in the **center** of a clean large glass slide. If you put too large a piece of cotton on the slide it will just be a dark blob.
2. Place **one drop of water** directly over the cotton strands (specimen). If you put too much water on the slide it will just be a wet mess.
3. Place a small, square **coverslip** at a 45 degree angle, one edge touching the water drop and gently lower it over the water drop / specimen. Performed with skill and mastery, the coverslip will lay down and the water will spread out and you will have a sweet slide.
4. Follow steps 1 and 2 from the above (Viewing a Slide) section (but with the cotton slide you just made).

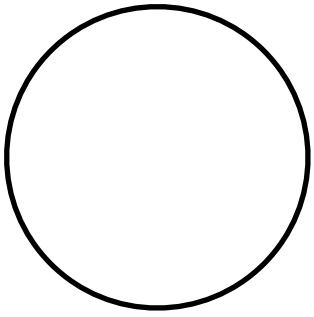
Scanning



Low Power



High Power



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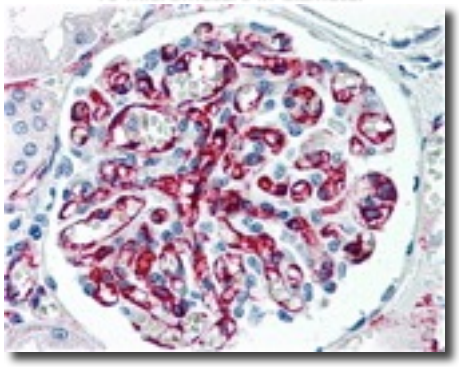
☑ **Extra Credit Review:** Look at the cotton fibers. What are they?

☑ **Thinker Clues** *What is cotton (it is either organic or inorganic...right)? If it is organic...then what? What type of what is cotton then?

Long strands - long chains - many small things linked - polysibly cotton is a type of....

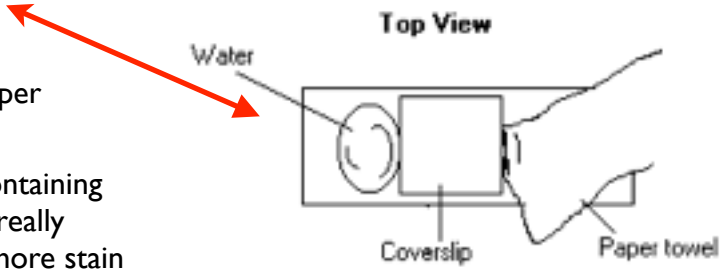
3. Staining a Specimen

Human antibody protein stained
~10 micrometers in diameter



Biologists stain specimens to better see what is going on in there. Staining brings out the details - much like shadows bring out details on rough objects.

1. Remove your cotton-specimen slide from the observation plate and place it on the lab table.
2. Place one drop of stain (iodine) on the edge of the coverslip you made with the cotton.
3. READ THIS CAREFULLY - Take a piece of paper towel and place the flat edge of it on the opposite side of the coverslip. The paper towel will draw the water out from under the coverslip, and the cohesion (ionic pull of electrons) of water will draw the stain under the slide...super cool!



4. As soon as the stain has covered the area containing the specimen, you are done! If your stain is really weak - get a new piece of paper towel, add more stain and do it again till you are solid.
5. Gently swab away any excess water/stain with a paper towel if necessary.

6. Focus your slide with the scanning objective then move to the low power and focus again. **Draw** your stained cotton-specimen exactly as it appears under the **low power**.

Low Power

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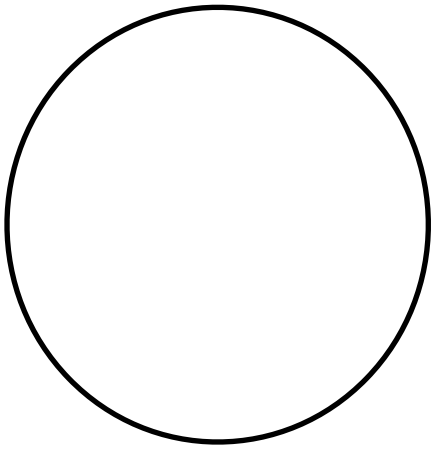
4. Puddle Diving - Pond Water and Microorganisms

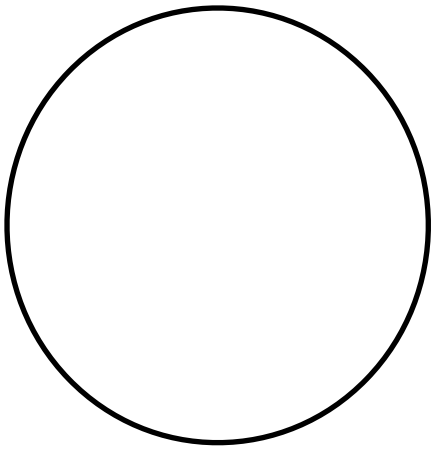
You are now ready to undertake the task of being a genuine, certifiable biologist - awesome progress. While we may think of ponds as rather large puddles that are "gross" and mucky - they are however incredibly biologically rich places teaming with life! On your lab tables are dishes filled with some locally collected pond water - let's take a look at what's been right under your nose this whole time!

1. Stir the pond water in the dish before you sample it to ensure that all bits and organisms are evenly distributed (even your odds of catching them).
2. Prepare a wet mount of **pond water** (steps 2.2 and 2.3, no cotton).
3. **Focus** the slide in using the **scanning** objective first. Look for things wiggling and moving around, also look for signs of "organization" - little balls stuck together - *patterns and organization are often clues pointing to life.* Scan slowly back and forth and up and down across your slide - try to *develop a search pattern* for scanning your slide.
4. **Draw** the critters you find as best you can. Remember to **label** the drawings, specifically the magnification you were using (we want to know if these things are huge or small right?)!

SAMPLE 1



SAMPLE 2



SAMPLE 1
Date:

Specimen:

Magnification:

Stain:

Critter Count/Notes:

SAMPLE 2
Date:

Specimen:

Magnification:

Stain:

Critter Count/Notes:

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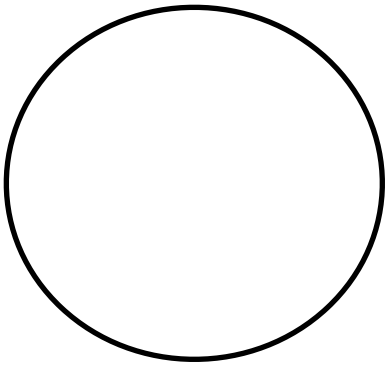
5. Cheek Cell Smear - open up and say "DNAaaa..."

Cells are the building blocks - the bricks if you will - of life, and we are a giant mass of them! You can actually see the tiny bricks that make you what and who you are rather easily, as we are about to do. Get ready to scrape your face and uncover the secret of life!

1. With a **toothpick** (preferable a clean one), **wipe the inside of your cheek** - take a few swipes around in there and really get some good stuff.
2. Place a **drop** of **iodine** in the center of a clean slide and carefully **rub the toothpick** around in the droplet of iodine.
3. Place a **coverslip** over the droplet.
4. **Focus** using the **scanning** objective first. Your cells will appear as little, amber colored crumbs at this magnification. **Center** the best of the best cells perfectly in your field of view and then move up a magnification - focus again and center. Also remember to adjust your ***diaphragm*** (amount of light you are letting pass through the slide).
5. Work between the scanning and the low power objectives until you get a good cell perfectly in view in the center and that has the diaphragm (light) properly adjusted. Then go to the **high power** objective and focus. You should be able to see a dark spot in the center of the cell - this dark spot is the cell's **nucleus** - the warehouse where all the DNA is stored! Draw what you see here - detailed and with super-extreme accuracy please!!!

High Power



Post-Lab

If time allows - prepare slides using several strands of hair, a slice of onion, or keep looking at pond water samples and find interesting things.

Use a piece of scratch-paper and sketch out what you are looking at in a circle, label it, and write the magnification below it. Basically this is like extra credit...only with life points.

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Additional observations

Amoeba Cells

Amoeba's are a single-celled organism that contain a nucleus, and have different organelles inside of their cytoplasm that allow them to break down food and nutrients.

What type of cell would an amoeba be?

Place the Amoeba proteus slide under your microscope and focus it first on the objective and focus it. Center one of the amoeba's directly in the middle of your field of view. Next, click to the next highest power and focus it again. Lastly, place it under the third highest power (around 400x magnification). Draw the amoeba in the circle below and answer the following questions.

High Power Amoeba

What cell drawing from the previous lab pages does the amoeba most closely resemble?

What does the amoeba cell and your cheek cell have in common (what observable, physical characteristic do they share)?

SAMPLE
Date:

Specimen:

Magnification:

Stain:

Critter Count/Notes:

SAMPLE
Date:

Specimen:

Magnification:

Stain:

Critter Count/Notes:

NAME: DATE: PERIOD:

SAMPLE
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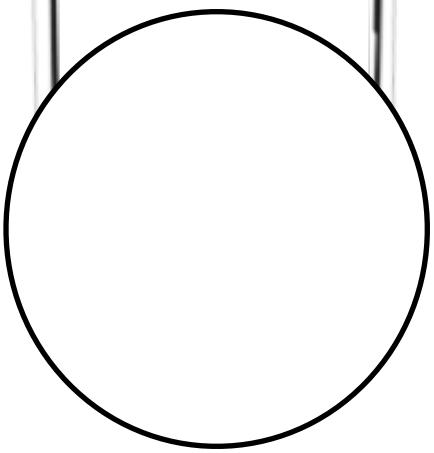

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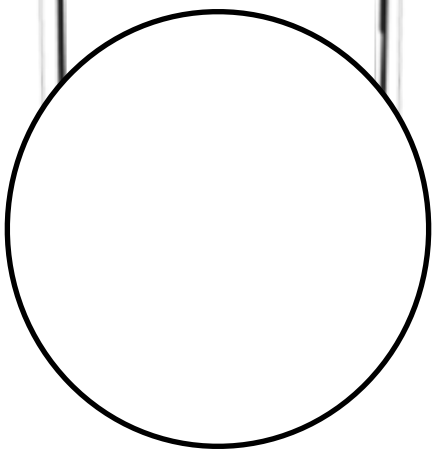
Stain:



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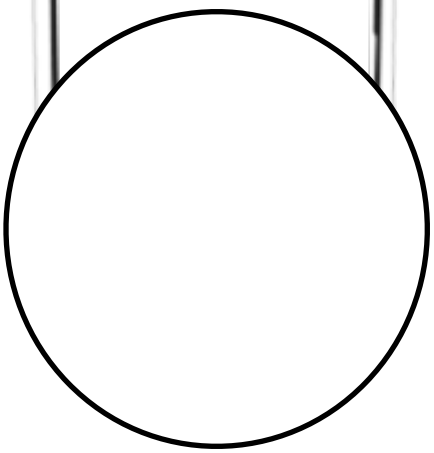
Stain:



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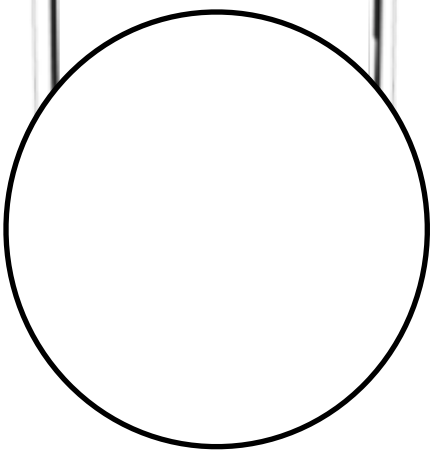
Stain:



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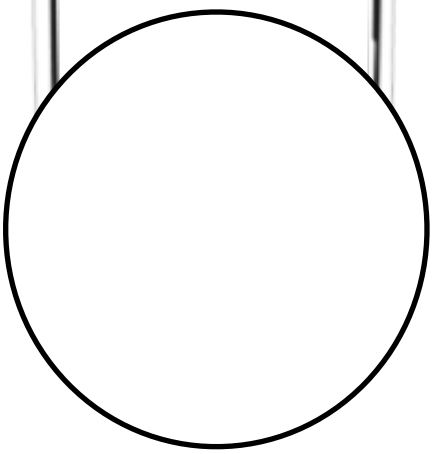
Specimen:

Magnification:

Stain:



SAMPLE
Date:

Specimen:

Magnification:

Stain: