

You will use the Internet and any print material you wish to find background information for the beginning of our trace evidence unit. The first area you will explore will be the proper use of microscopes, including understanding how they work, and a little bit of their history. The second area you will explore is hair evidence. Use separate paper to answer all of the questions. You will hand this information in to me before you will be able to use your microscopes in the lab.

#### PART ONE: THE MICROSCOPE

1. The compound microscope consists of a mechanical system, which supports the microscope and an optical system, which illuminates the object under investigation and passes the light through a series of lenses to form an image of the specimen on the retina of the eye. Describe the way each part of the microscope works. Include all of the parts of the mechanical system (base, arm, stage, body tube, coarse adjustment, fine adjustment) and the optical system (illuminator, condenser, objective lens, eyepiece or ocular lens) in your explanation.
2. Define the terms transmitted illumination, vertical or reflected illumination, parfocal, monocular, binocular, virtual image, depth of focus, field of view.
3. What happens to the field of view as the magnifying power increases? What happens to the depth of focus as the magnifying power increases?
4. What is a comparison microscope? What is a stereoscopic microscope? How are these different from the compound microscope.
5. What is a polarizing microscope and how does it work? What is a microspectrophotometer?
6. How does a scanning electron microscope work?
7. Be prepared to label all of the parts of the microscope on a picture or diagram.
8. Write a short paragraph about the history of the invention of the microscope.

Here are some websites *to get you started*:

<https://docs.google.com/document/d/1v5hZmYXm5IJSKbr7C4SxNsMfq2QcilJeaEKssvISj0w/edit>  
<http://www2.mrc-lmb.cam.ac.uk/microscopes4schools/microscopes2.php>  
<http://www2.mrc-lmb.cam.ac.uk/microscopes4schools/microscopes1.php>  
<https://microscope-microscope.org/microscope-info/microscope-parts/>  
<http://micro.magnet.fsu.edu/primer/anatomy/anatomy.html> (excellent)  
<https://microscope-microscope.org/microscope-info/microscope-history/>

#### PART TWO: HAIR EVIDENCE

1. Define and describe the cuticle, cortex, and medulla areas of hair and be able to recognize these under the microscope.
2. Describe the three different phases of hair growth.
3. How does one distinguish human from animal hair?
4. List hair features that are useful for microscopic comparison human hairs.
5. Explain proper collection of forensic hair evidence.
6. What is the role of DNA typing in hair evidence?
7. Can the age and sex of an individual be determined from a hair sample? How?
8. Can the body area from which a hair originated be determined? How?
9. Can the racial origin of hair be determined? How?
- 10.

<http://www.fbi.gov/about-us/lab/forensic-science-communications/fsc/july2000/deedrick1.htm> (excellent - see this one first!)

[http://www.fbi.gov/about-us/lab/forensic-science-communications/fsc/jan2004/research/2004\\_01\\_research01b.htm](http://www.fbi.gov/about-us/lab/forensic-science-communications/fsc/jan2004/research/2004_01_research01b.htm)  
back issue-july 2004 Deedrick-Animal hair

<http://crimeandclues.com/2013/04/05/trace-evidence-hair/>  
[https://archives.fbi.gov/archives/about-us/lab/forensic-science-communications/fsc/april2005/standards/2005\\_04\\_standards02.htm](https://archives.fbi.gov/archives/about-us/lab/forensic-science-communications/fsc/april2005/standards/2005_04_standards02.htm)  
<http://www.fbi.gov/news/stories/2005/march/hair031605> (take this quiz last)