

OBJECTIVE: In this exploration lab, students will investigate various types of bacteria, and fungi using advanced analytical instrumentation to enhance their understanding of the kingdoms of living organisms.

ACTIVITY DESCRIPTION: Using the optical microscope and the cyber-enabled scanning electron microscope (SEM), students will study various micro-organisms. They will investigate and obtain micrographs (images) of diatoms located in algae, and various types of bacteria.

MATERIALS:

Scanning Electron Microscope (cyber-enabled)	Molded peach skin
SEM specimen mount	Cyanobacteria mixture
Carbon tape	Sputtering apparatus (gold or carbon coating)
Scissors	Tweezers
Carbon panache/platelet	Latex/Nitrile gloves
Molded tomato skin	

PROCEDURE:

Part A: Optical Microscopy

1. Place samples on a microscope slide and view (in classroom) using optical microscopes.
2. Record detailed observations (i.e. color, shape, size, transparency, etc.) for each specimen.

Part B: Electron Microscopy

1. Put on gloves
2. Cut several small pieces of double-sided carbon tape and place on specimen mount.
3. Place a number next to each piece of tape to indicate the “specimen number”.
4. Use tweezers/forceps to place a small amount of each specimen onto one of the carbon panaches. Allow any liquid to air dry.
5. Once the specimens are dry, place carbon panache on each piece of carbon tape (make sure specimen number is visible). Once the platelet is securely mounted, *invert the specimen mount* to ensure that the materials will remain mounted upon introduction to vacuum.
6. **Optional:** Place mount containing specimen in the sputtering apparatus and coat with a layer of conductive material (either Au or C).
7. Once the specimen is ready for imaging, transfer it into the SEM and proceed.
8. Use an acceleration voltage of 5kV to image the samples, and only increase if ideal resolution is not obtainable.
9. Find a “specimen number” to indicate what is being viewed, image the specimen and determine what kingdom the specimen belongs. Try to identify unique characteristics of each material. Take a photo!
10. Repeat **step 9** for all other samples as well. Record your observations.
11. Compare observations from **Part A** to micrographs collected in **Part B** to determine which SEM image correlates to the various samples.