

Hamilton VP-SCOPE Digital Microscope Camera Curriculum Guide

Prepared by Tara Weinstein, April 2011

Introduction

Microscopes have long been a part of every science curriculum, but they have been traditionally restricted to the biology classroom for use with slides. While there is certainly no shortage of fascinating biological specimens to observe, there are innumerable other phenomena that would benefit from closer inspection but that don't lend themselves to being mounted on a slide. Because this microscope works like a digital camera, it can be used not only for traditional biological applications but also for physics, chemistry, and elementary school education. When the microscope is used for biology, it can often be used more efficiently since the step of preparing a slide can often be skipped. The examples below should serve merely as a launch point for your own applications.

Downloading Images from the Microscope to your Computer

On a Mac (OS X)

1. Connect the microscope via USB to your computer.
2. Make sure that the microscope is turned on and switched to USB Disk mode. To do this, turn on the microscope, then click on the Home button. You may select USB Disk mode by toggling through the options available.
3. Two drives should show up on your desktop. All picture files are located in the "NO NAME" drive, and can be downloaded and deleted from there.

On a PC

1. Connect the microscope via USB to your computer.
2. Make sure that the microscope is turned on and switched to USB Disk mode. To do this, turn on the microscope, then click on the Home button. You may select USB Disk mode by toggling through the options available.
3. A removable disk drive should show up. (This is often, but not always, the F drive, depending on how drives have been allocated on your computer.) All picture files are located in the removable drive, and can be downloaded and deleted from there.

Sample Applications

Investigating Ourselves



Students are naturally curious about themselves. Many middle school or biology classes involve taking, preparing, and examining a cheek swab sample, but students have not generally had the opportunity to explore other parts of themselves close-up. This can be used not only in the biology classroom, but also as part of a forensic science course.

The image to the left shows a hair with a split end.



The image to the left is of the skin on an arm.

Animals



While most animals can be seen in their entirety without magnification, some, such as insects, benefit from close inspection.



Even when magnification of an entire specimen is not required, the microscope can be used to examine certain parts more closely without requiring any dissection or other specialized skills or equipment.

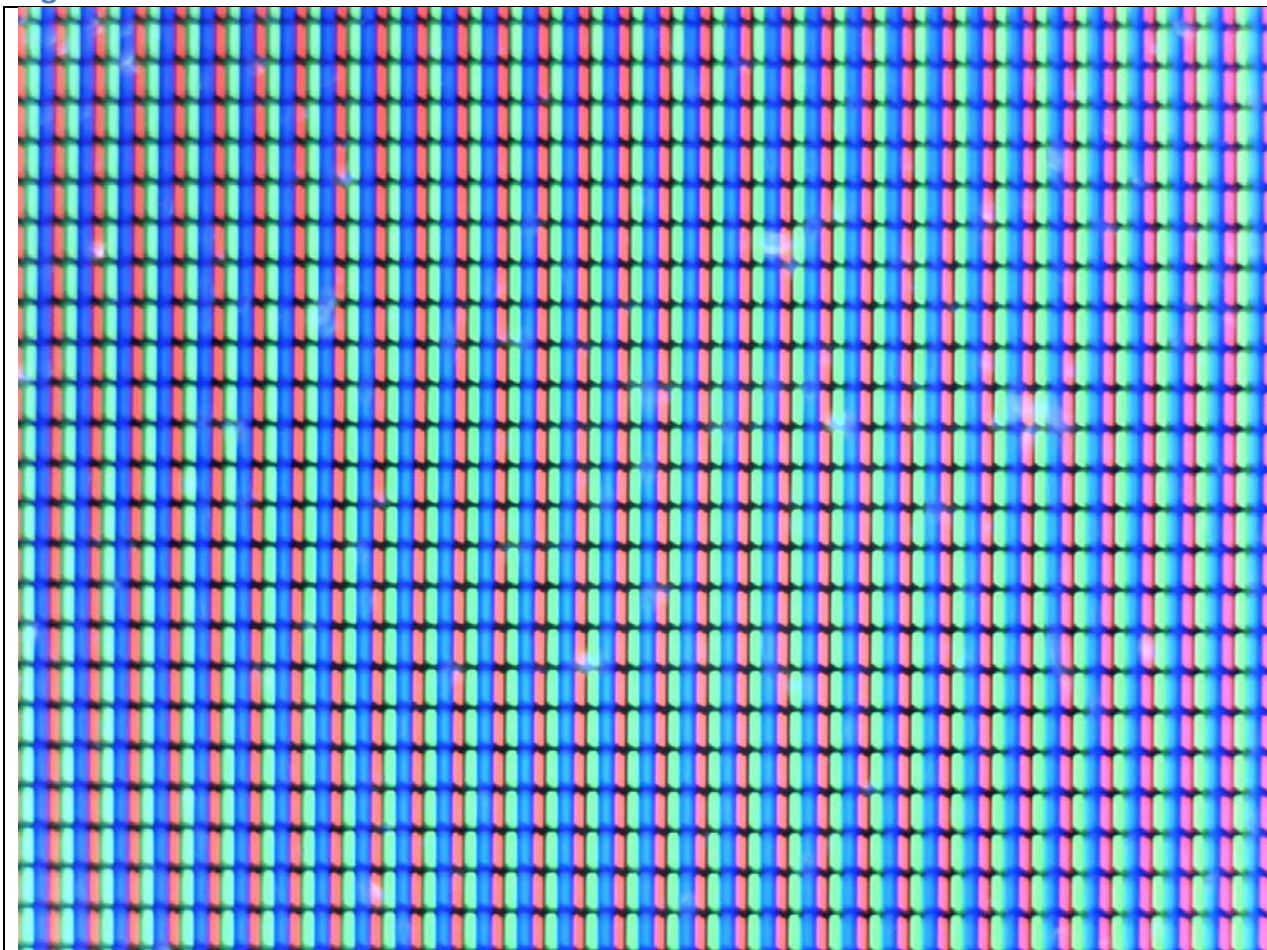
The image to the left shows an insect wing, which is very fragile and easily damaged when trying to detach it from the rest of the insect's body. In addition, since no dissection is required in order to create a slide, images can be taken of living creatures without causing any harm to them.

Electricity



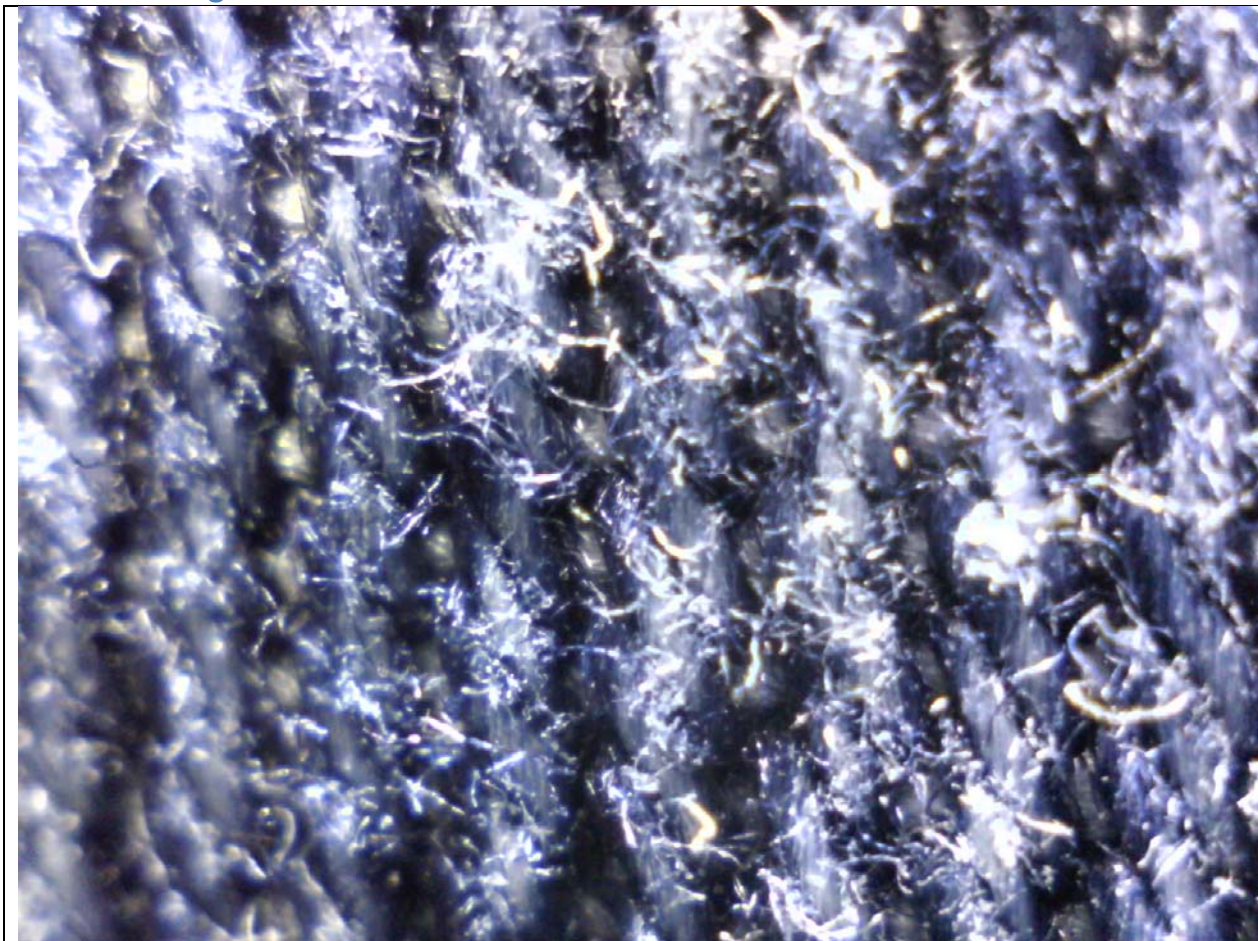
Students are often frustrated when studying electricity because they cannot see the electrons involved, and this leads to a variety of misconceptions. One of the most common ones is that electricity can just “jump” from one point of contact to another, and they don’t realize that a continuous conducting path is required. Although the electrons cannot be seen with any microscope, zooming in on devices that use electricity can show students that conductors must always be present for electricity to show. The picture above shows the filament of a light bulb, attached to its support wires.

Light



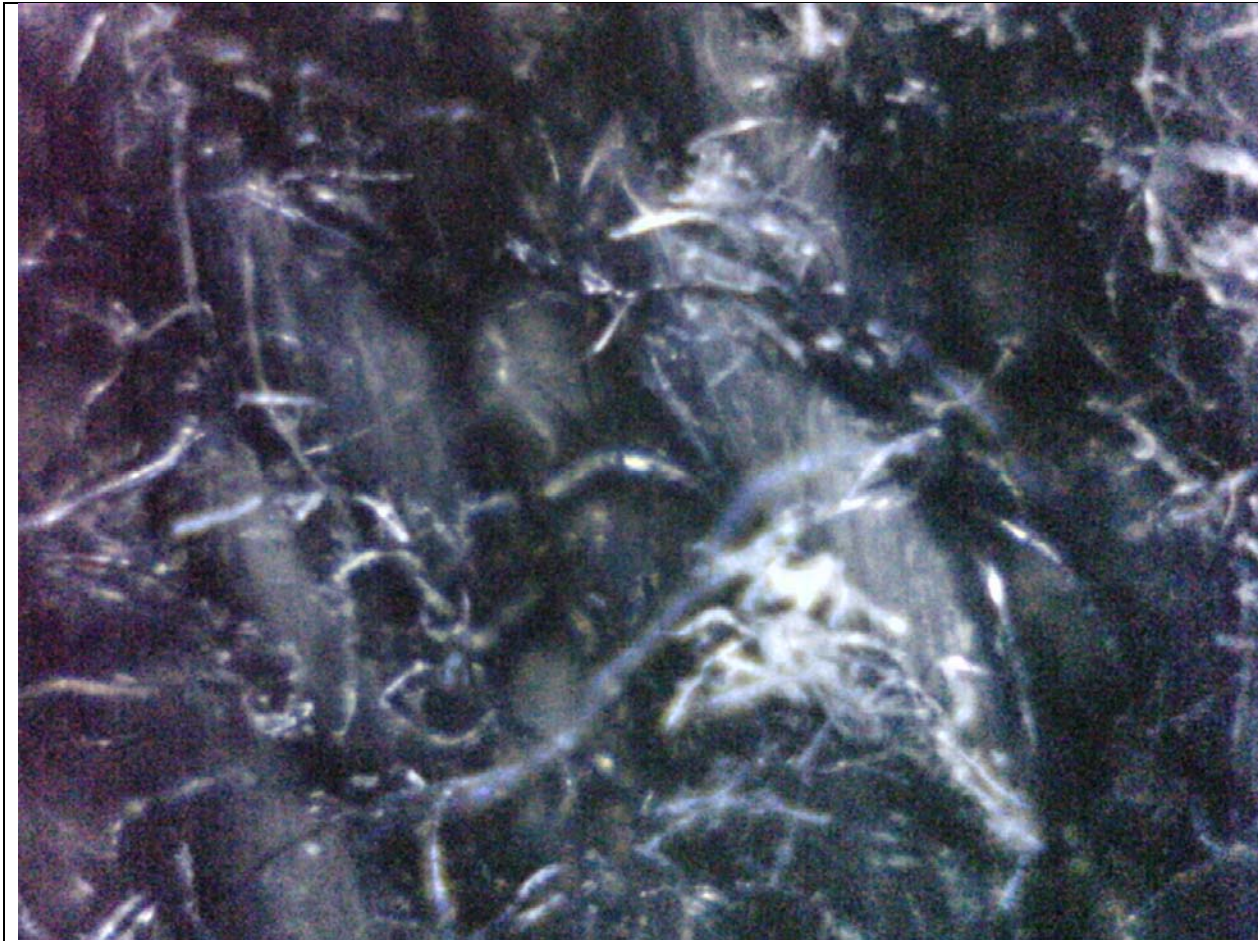
All students are taught in kindergarten that the primary colors are red, yellow, and blue, but this is simply untrue. They are relatively easily able to adapt to the idea that the primary colors of pigment are cyan, magenta, and yellow since they have experience with ink-jet printers that use cartridges of those colors, but the concept of mixing light poses a new challenge. They simply cannot grasp that the primary colors in this case are red, green, and blue. They are, however, very comfortable with devices that use the mixing of light to produce the full spectrum, such as computer screen, televisions, and projected images. Zooming in on a computer screen, as shown above, allows students to see the individual red, green, and blue pixels in a white background, and as the background color is changed, students can see individual pixels turn off, on, and change in intensity.

Orders of Magnitude



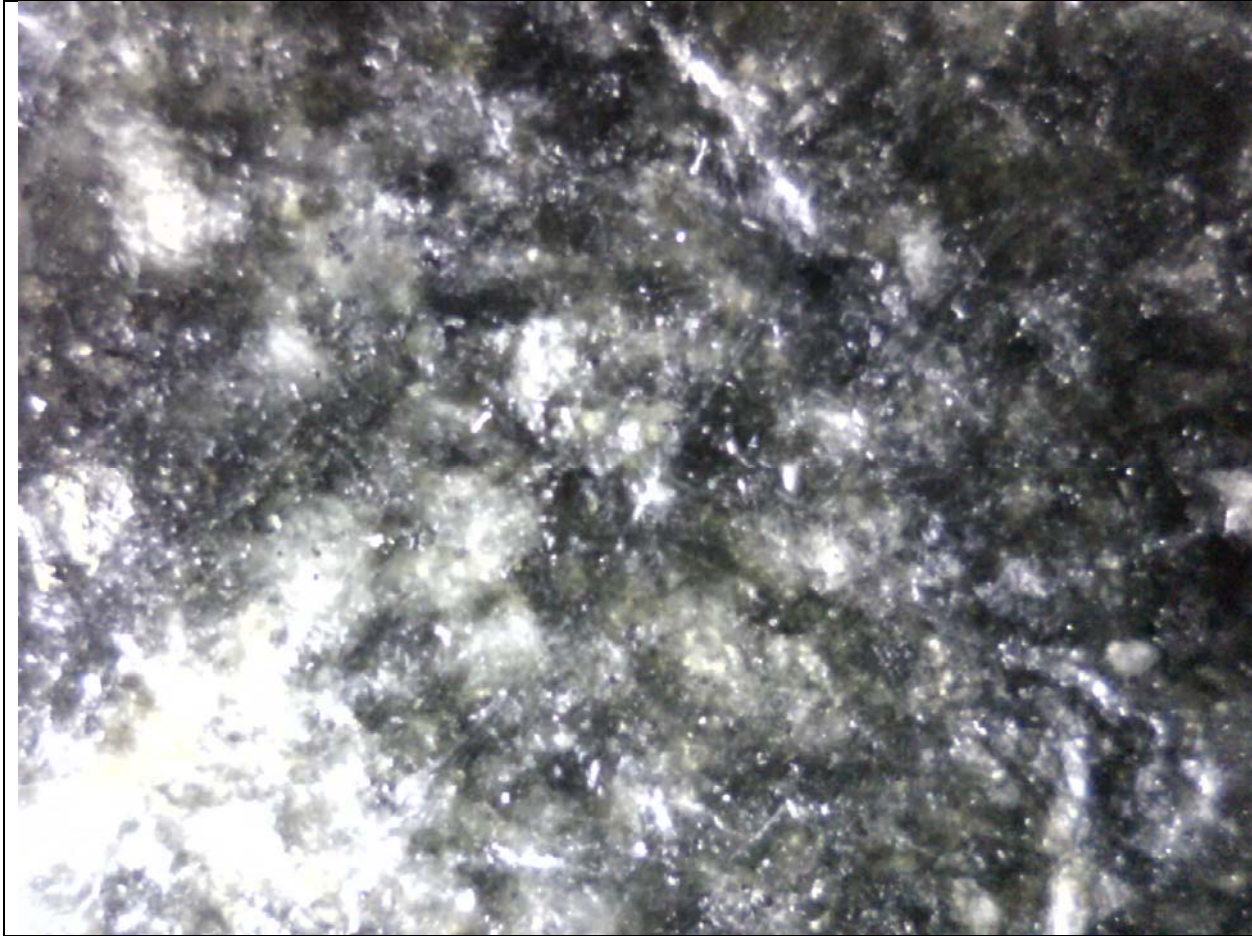
Students often have trouble internalizing the very small and the very large. Many educators are familiar with the film *Powers of Ten*, which brilliantly gets the point across by dramatically zooming in and then out on a sunbather. Using the digital microscope, the same effect can be achieved right in front of them. The two images here are of the same piece of fabric.

This first image is zoomed in enough to focus on the weave of the fabric.



This second image shows the fibers instead.

Geology



The microscope can also be used to examine different types of stone samples in order to acquire information about mineral deposits and chemical makeup.

Other Applications



When the microscope is zoomed out, it can be used like a regular camera. It has both still and video modes, and can even be used for web conferencing.

For VP-SCOPE Product Support visit www.HamiltonBuhl.com or call 800-631-0868