

Fall 2016

Scanning Electron Microscopy Laboratory Portfolio

Nadia Abuqube

SUNY College of Environmental Science and Forestry

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Scanning Electron Microscopy
Laboratory Portfolio
Nadia Abuqube
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Submitted for
MCR 484/783 Scanning Electron Microscopy
Fall 2016
N.C. Brown Center for Ultrastructure Studies



State University of New York
College of Environmental Science and Forestry

These images were prepared as part of the class MCR 484 Scanning Electron Microscopy at SUNY College of Environmental Science and Forestry, Fall 2016.

All images were acquired on the JEOL JSM 5800 LV Scanning Electron Microscope in the N. C. Brown Center for Ultrastructure Studies

Nadia Abuqube

Major: Biotechnology

Minor: Microscopy

Career Goals: Interested in plant research and phytoremediation.

The images found in this collection are examples of the knowledge and skills I have developed through the MCR 484 Scanning Electron Microscopy course taken in the fall of 2016.

I took this course because I wanted to learn more about the Scanning Electron Microscope and how it operates. Knowing how to capture quality images on the SEM is also a beneficial skill to have in my field of study.

Table of Contents

The images I am presenting in this collection were chosen because they exemplify the knowledge and skills I have developed along with the care, quality, and concern for the work I produce.

Description

1. My Best Work
2. The Hardest
3. My Favorite
4. Low Accelerating Voltage
5. High Magnification
6. Red/Green Stereo Imaging

Figure 1: My Best Image

I have chosen this as my best image because it shows how the technique of critical point drying preserves a sample's features. Surface details are clear and add to the overall story of the maple leaf. There is also a nice balance of brightness and contrast.

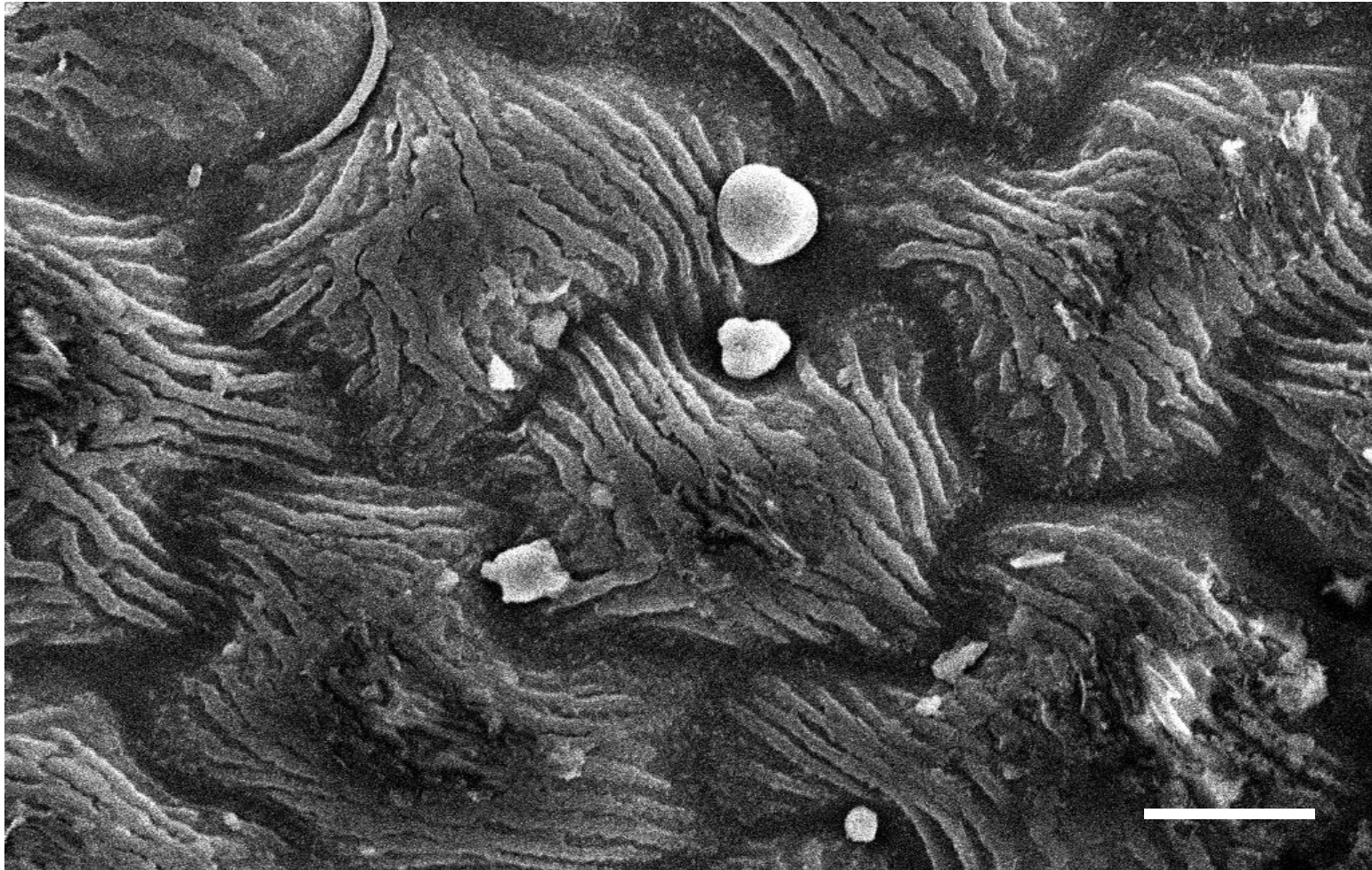


Figure 1. My Best Image: Secondary Electron Image of the top surface of a maple leaf fixed in paraformaldehyde/glutaraldehyde and OsO_4 solutions, dried by critical point drying and sputter coated with Au metal. The image was captured at a spot size of 9 chevrons, 1500X magnification, 19 mm working distance, and an accelerating voltage of 15 kV. Micron bar= 10 μm

Figure 2: The Hardest Image to Capture

I have chosen this as the hardest image to capture because it was difficult trying to minimize charging while using a large accelerating voltage. The image shows poor surface detail of the watch gear's residue due to deeper interaction of the electron beam with the sample. Resolution is maintained.



Figure 2. Hardest Image to Capture: Secondary Electron Image of a watch gear's residue captured at a spot size of 10 chevrons, 6000X magnification, 21 mm working distance, objective aperture of 1, and an accelerating voltage of 25 kV. Micron bar= 2 μ m

Figure 3: My Favorite Image

I have chosen this as my favorite because it shows an appealing artistic viewpoint, and I like the contrast of the sample's surface textures. There is also great depth and nice grayscale balance. The use of solvent exchange distorted some of the structures, but it didn't take away from the image's aesthetic.

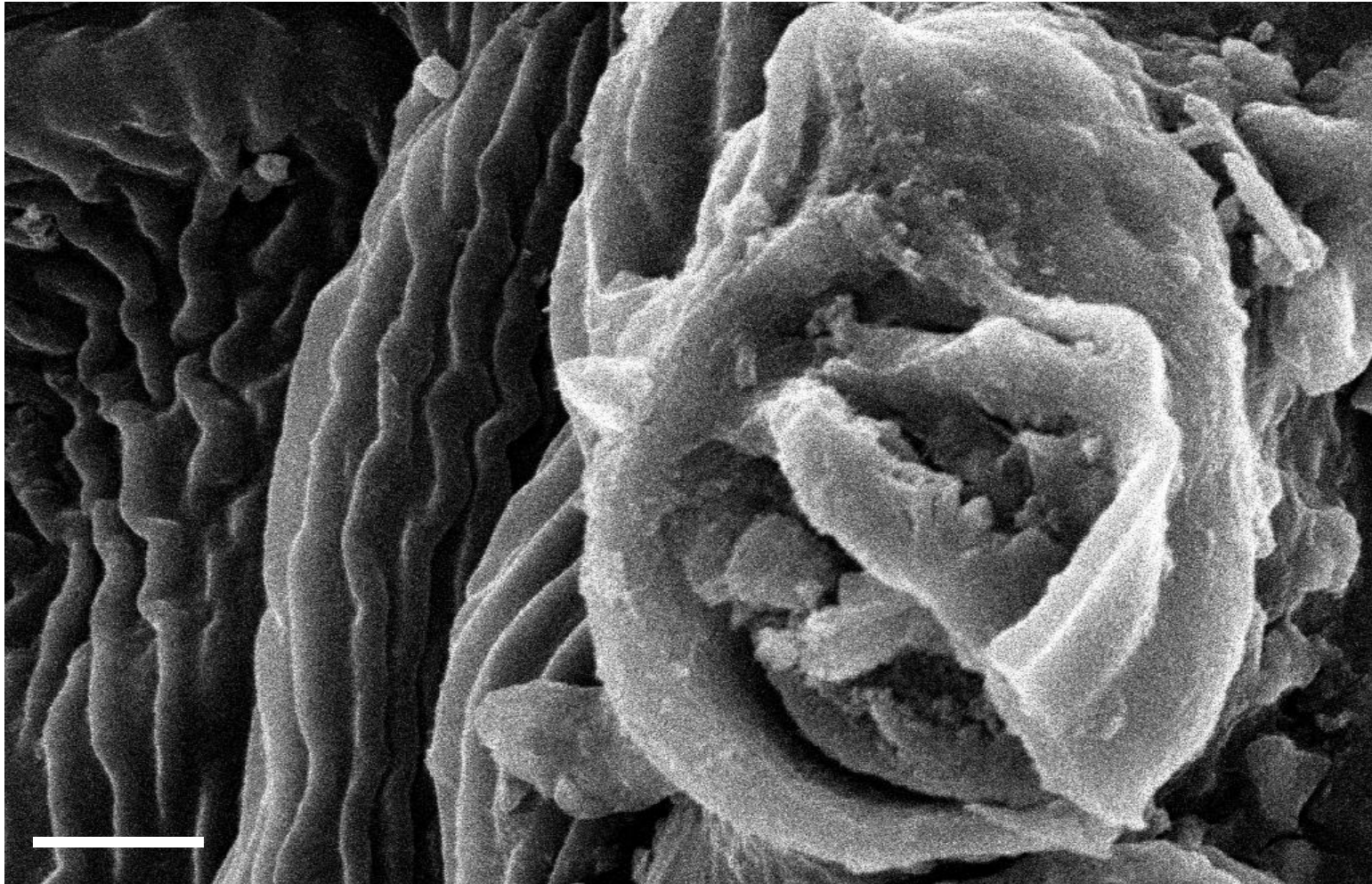


Figure 3. Favorite Image: Secondary Electron Image of the top surface of a maple leaf fixed in paraformaldehyde/glutaraldehyde and OsO_4 solutions, dried by solvent exchange with propylene oxide, and sputter coated with Au metal. The image was captured at a spot size of 8 chevrons, 3300X magnification, 20 mm working distance, and an accelerating voltage of 15 kV. Micron bar= 5 μm

Additional Examples of My Work

The following images are additional examples of my work. I have included them because they portray the variety of skills I've acquired while operating the Scanning Electron Microscope.

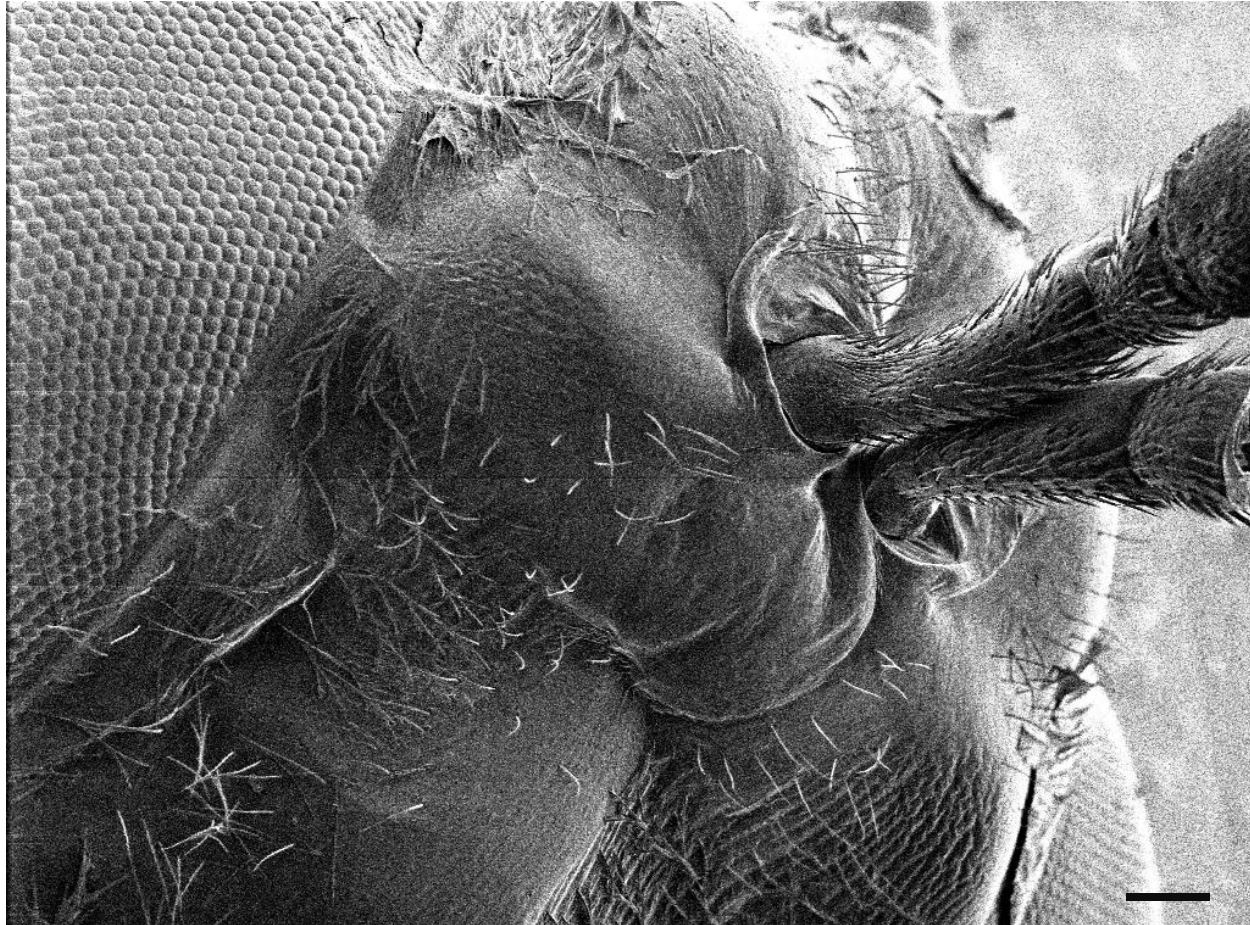


Figure 4. Low voltage (< 2kV) of uncoated biological sample: SEM image of a bug's head captured at a spot size of 12 chevrons, 85X magnification, 11 mm working distance, objective aperture of 2, and an accelerating voltage of 0.7 kV. Micron bar= 100 um

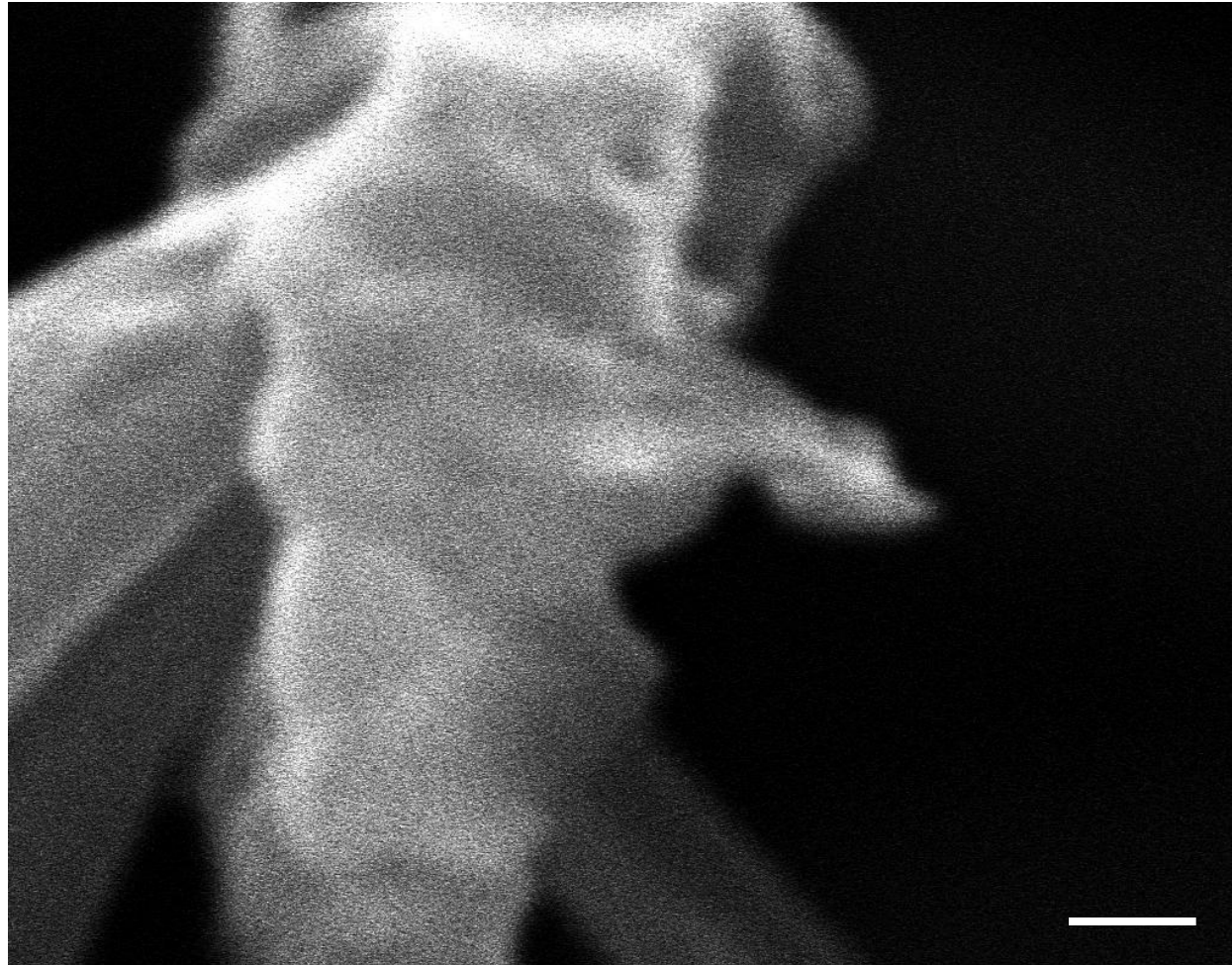


Figure 5. High Magnification: Image processed SEM micrograph of a mite captured at a spot size of 11 chevrons, 50,000X magnification, 12 mm working distance, objective aperture of 1, and an accelerating voltage of 25 kV. Surface details of the mite's foot were enhanced using grayscale in Adobe Photoshop, and the image was sharpened. Micron bar= 500 nm



Figure 6. Stereo Imaging: Red/green stereo image of two SEM images of Velcro, combined using Adobe Photoshop. SEM images were captured at a spot size of 14 chevrons, 55X magnification, 23 mm working distance, objective aperture of 1, accelerating voltage of 15 kV, and tilts of +7 and +19 degrees. Image size is 4x5, 200 pixels/inch.