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Scanning Electron Microscopy Laboratory Portfolio

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Scanning Electron Microscopy Laboratory Portfolio

Ian Newcomb

Fall, 2016

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,

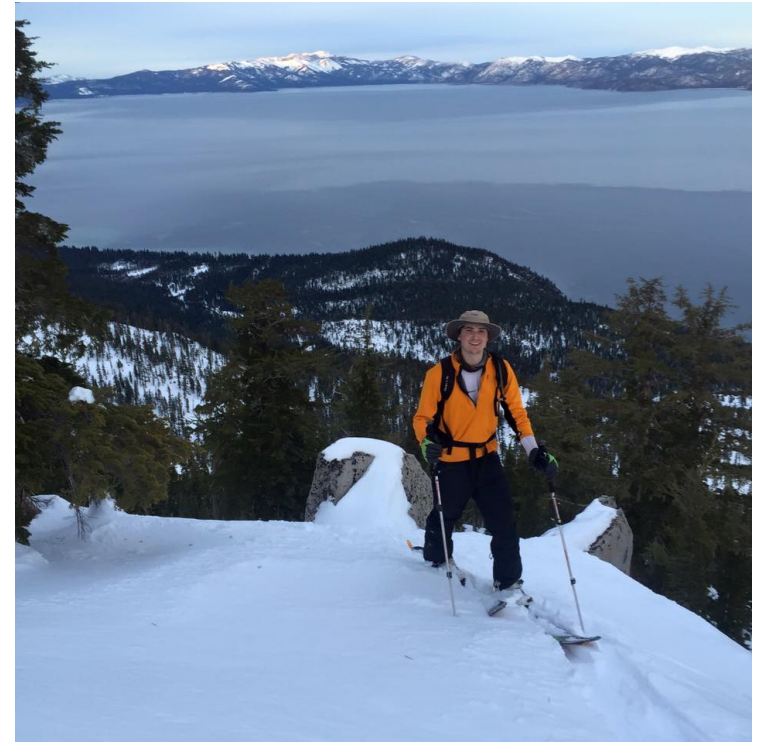
All images were acquired on the JEOL JSM 5800 LV Scanning Electron Microscope in the N. C. Brown Center for Ultrastructure Studies

Ian Newcomb

Major: Environmental Biology

Minor: Statistics

Career Goals: Research Entomologist



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 of the amazing micrographs I have seen of various fascinating insect structures at amazing resolving power. Insect structures that become apparent under scanning electron microscopy is immensely fascinating to me.

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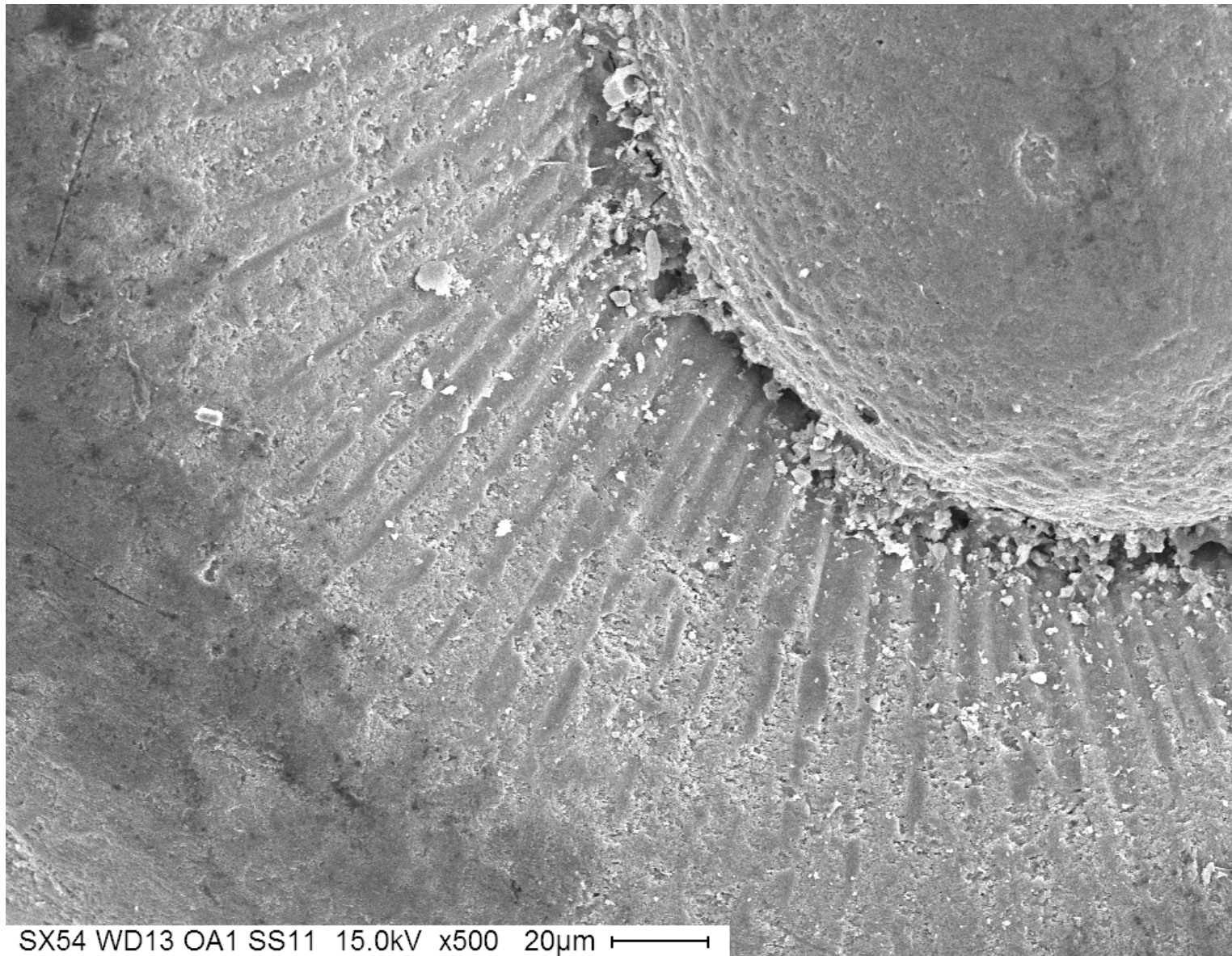
I images I am presenting in this collection were chosen because they exemplify the knowledge and skills I have developed along with the care, quality, and concern for the work I produce.

Description

1. My Best Work
2. The Hardest
3. My Favorite
4. Laboratory Images 1-10

Figure 1: My Best Image

I have chosen this as my best image because it shows an exceptional range of black and white as well as a satisfactory depth of field. This image also demonstrates the immense resolving power possible with a scanning electron microscope.



•Fig 1. Scanning Electron Micrograph of shell to observe effects of high magnification. Micrograph was taken with a working distance of 11. Bar = 20 um, WD = 13, Spot size 11, 15 kV. 500x

Figure 2: The Hardest Image to Capture

I have chosen this the hardest image to capture because I had to manipulate the parameters to produce a micrograph using an uncoated specimen. It shows comprehension of how to control a specimen and microscope to produce a satisfactory image with less than ideal framework.

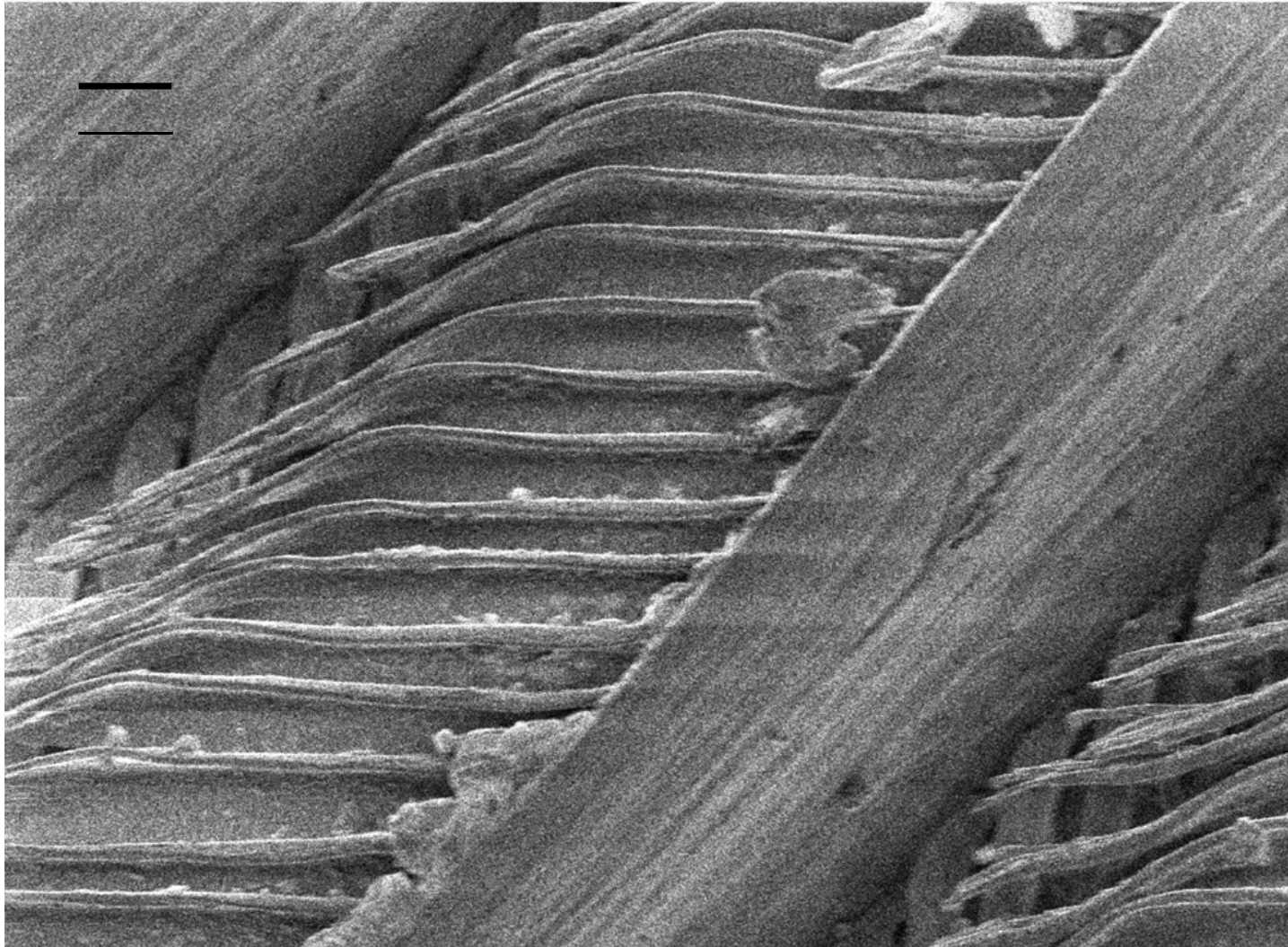


Figure 2. Scanning Electron Micrograph of feather to observe effects of low kV on uncoated biological samples. Micrograph was taken with a working distance of 11.2. Bar = 20 μm , WD = 11.2, Spot size 9, 1.0 kV. 500x.

Figure 3: My Favorite Image

I have chosen this as my favorite because it is the example of why I am so fascinated with scanning electron microscopy. The resolving power when applied to insect structures allows us to see things we otherwise would be perpetually ignorant to.



Figure 3. Favorite Image: Secondary Electron Image of Hymenopteran (Apocrita) posterior. WD 26, Objective apperture 1, 15.0 kV, 40x magnification. Bar = 200 uM.

Additional Examples of My Work

The following images are additional examples of my work I have included them because...

Images from Labs 1 -10

A portfolio of micrographs from lab sessions demonstrating the following techniques:

1. Secondary Electron Image and Probe diameter (spot size)
 1. Spot size 8
 2. Spot size 20
2. Specimen Preparation - Sputter Coating
3. Specimen Preparation - Critical Point Drying
4. Image Quality II -Depth of Field
 1. short WD, large aperture
 2. long WD, small aperture
5. Image Quality I -Accelerating Voltage
 1. 20 kV
 2. low kV
6. Backscattered Electron Imaging
 1. SEI image
 2. BEI image
7. Low voltage (< 2kV) of uncoated biological sample
8. High Magnification (OR X-ray spectrum, map and image)
9. Digital Imaging with Photoshop (OR Low Vacuum Imaging)
10. Stereo Pair

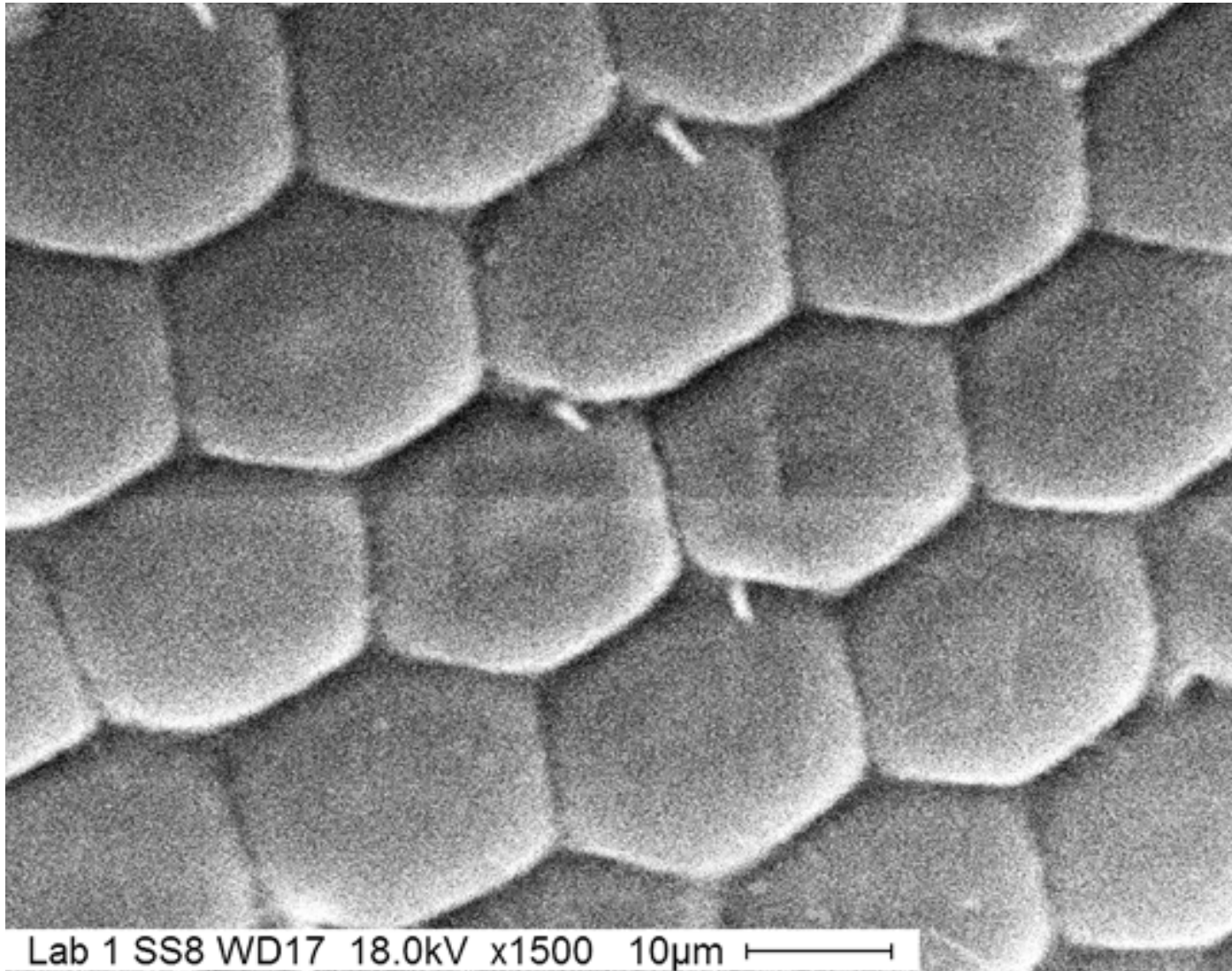


Figure 1a. Secondary Electron Image and Probe diameter (spot size). Small Spot size 8. Working distance of 17, Accelerating voltage of 18.0 at 1500x magnification. Bar 10 um

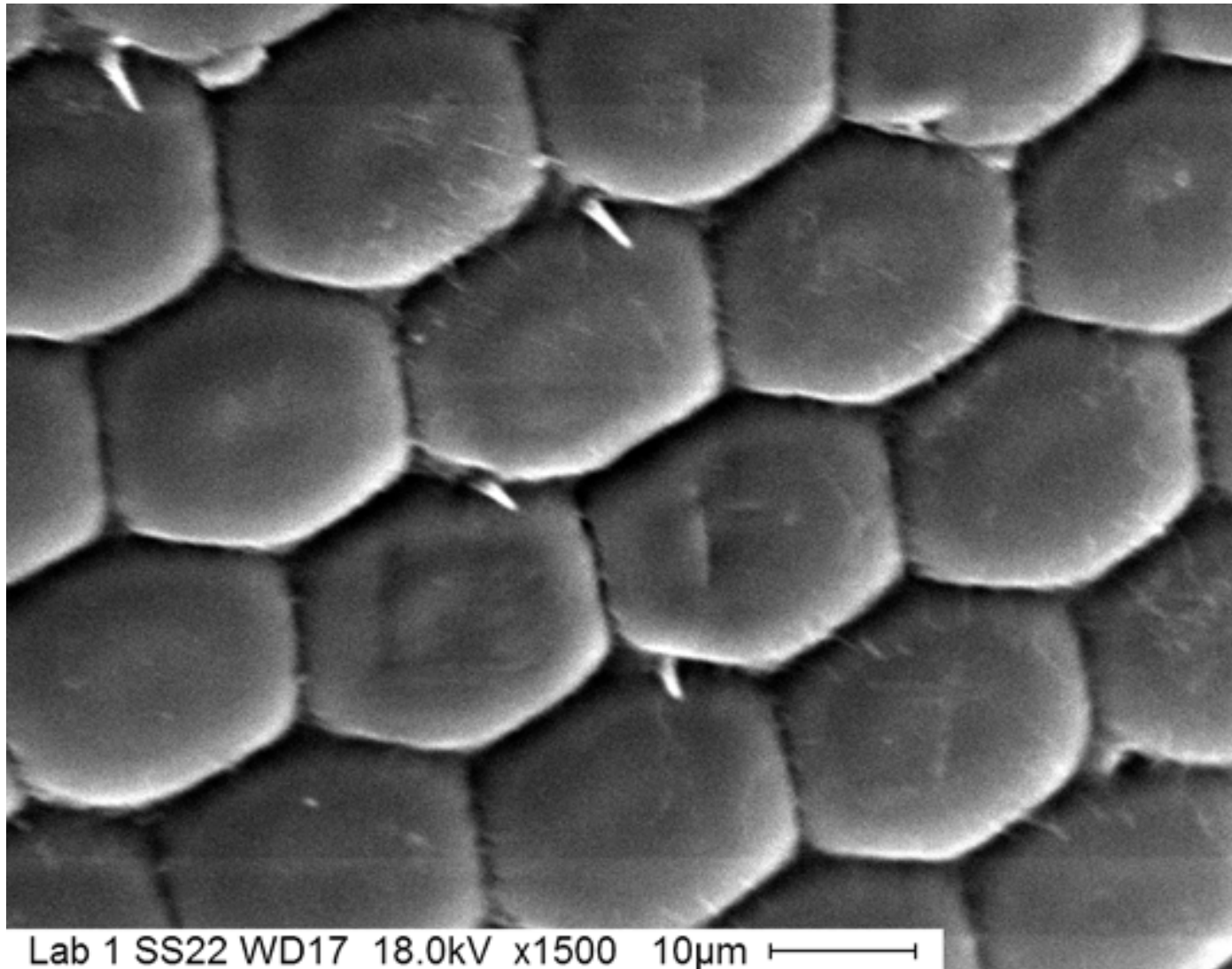


Figure 1b. Secondary Electron Image and Probe diameter (spot size). Large Spot size 22. Working distance of 17, Accelerating voltage of 18.0 at 1500x magnification. Bar 10 μm

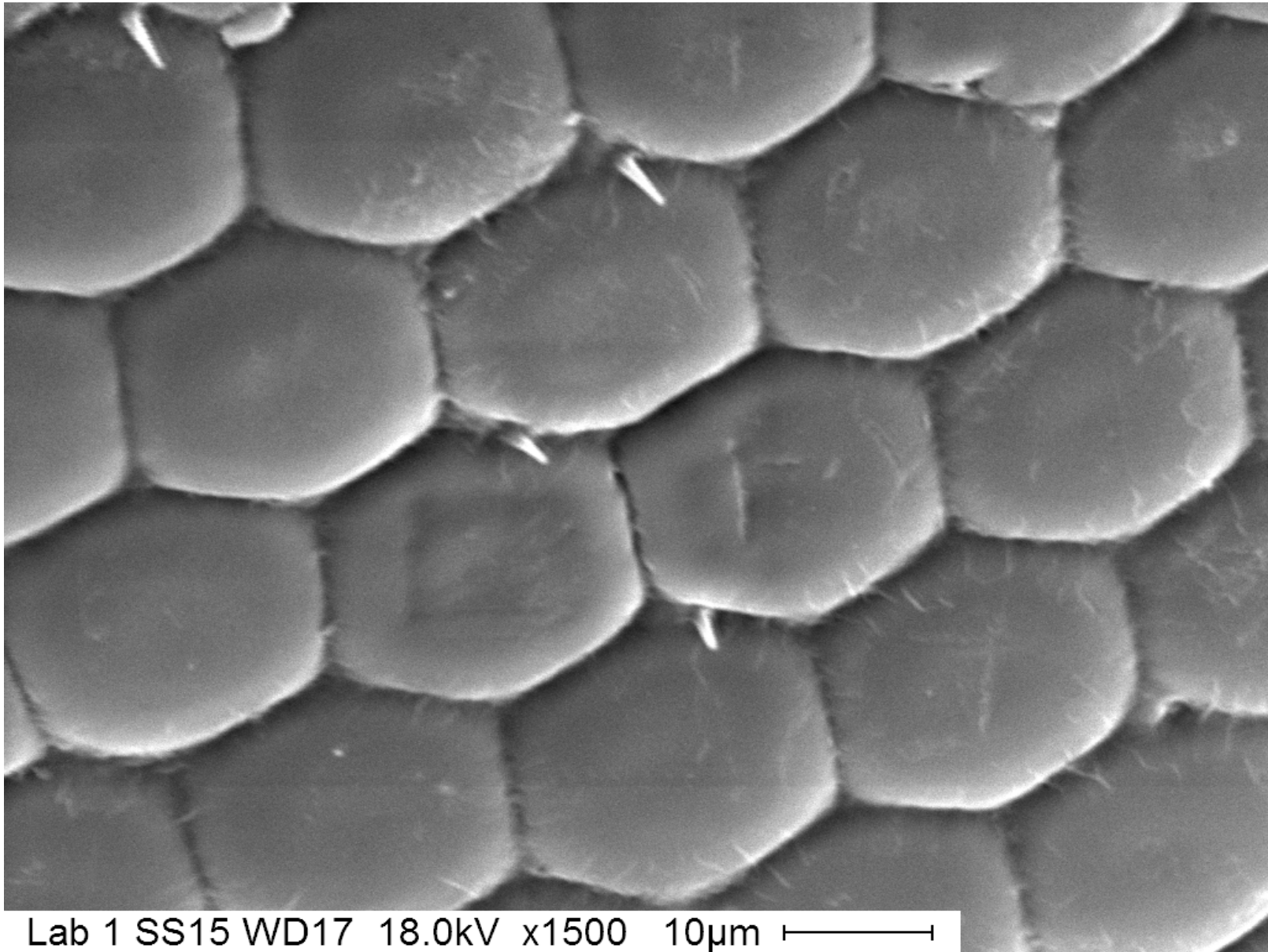


Figure 1c. Secondary Electron Image and Probe diameter (spot size). Adequate Spot size 15. Working distance of 17, Accelerating voltage of 18.0 at 1500x magnification. Bar 10 um

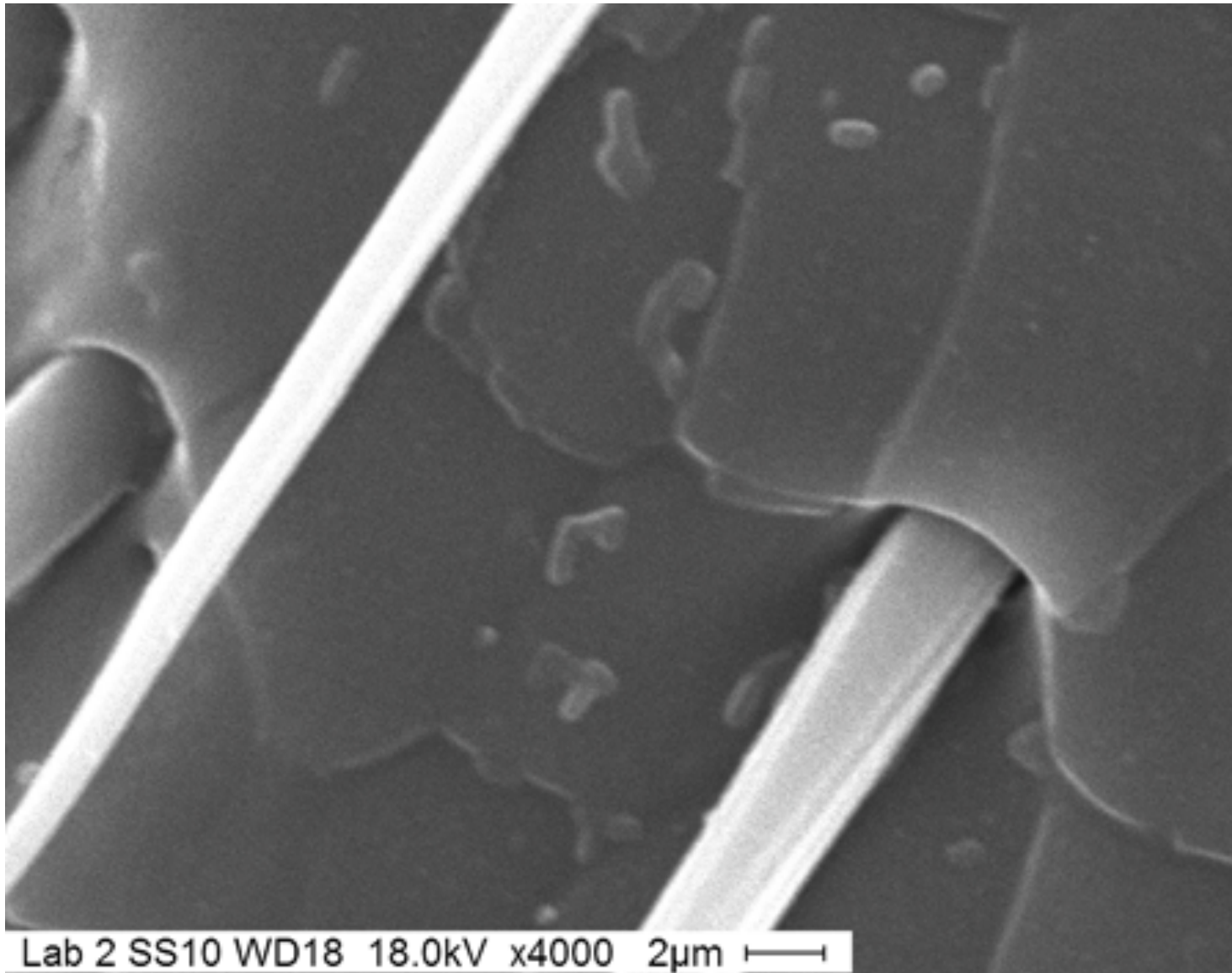


Figure 2. Specimen Preparation - Sputter Coating on lady bug body. Spot size 10, working distance 18, accelerating voltage 18, 4000x magnification, bar = 2um

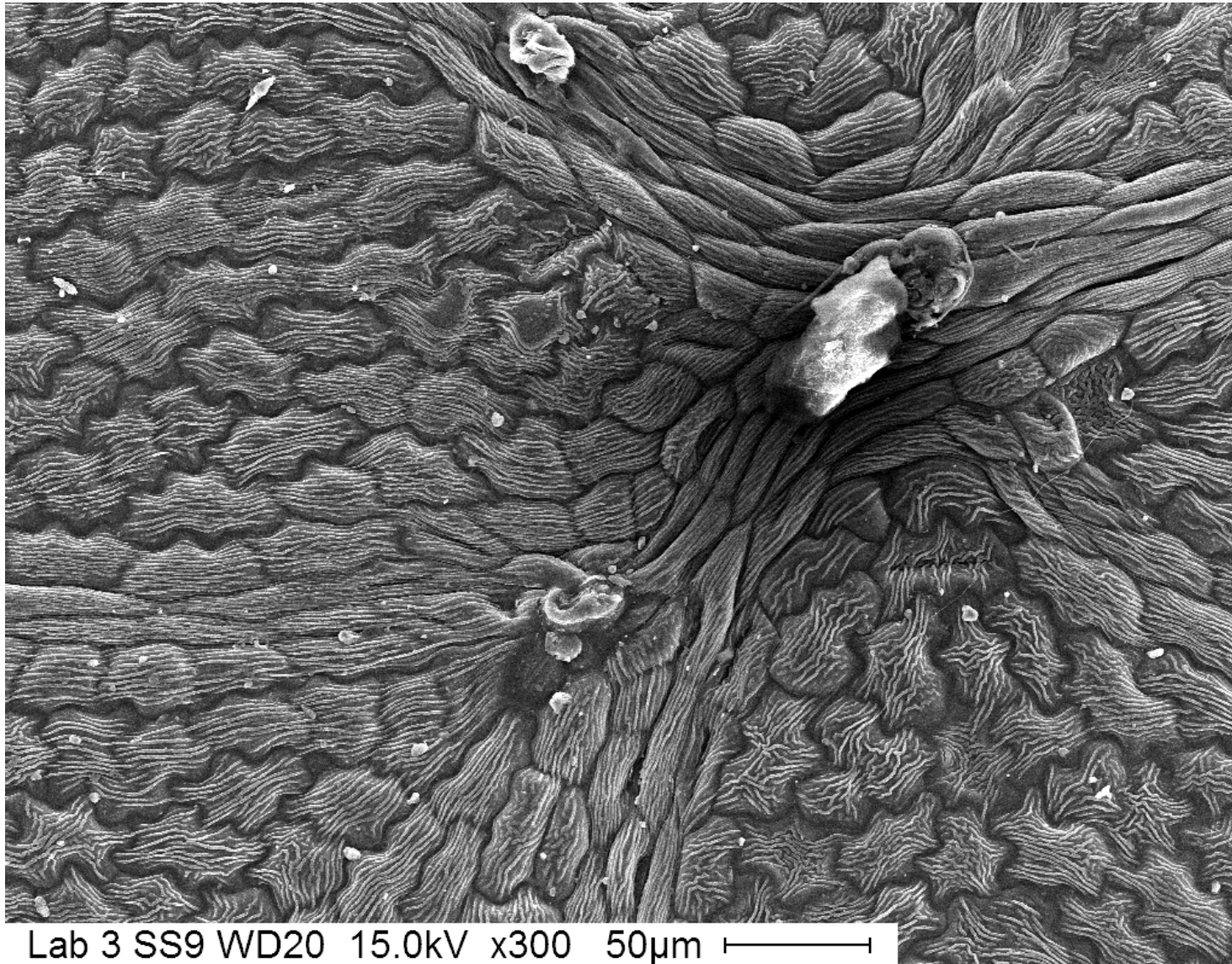


Figure 3. Specimen Preparation - Critical Point Drying of underside of maple leaf. Spot size 9, working distance 20, accelerating voltage, 300x magnification. Bar 50um

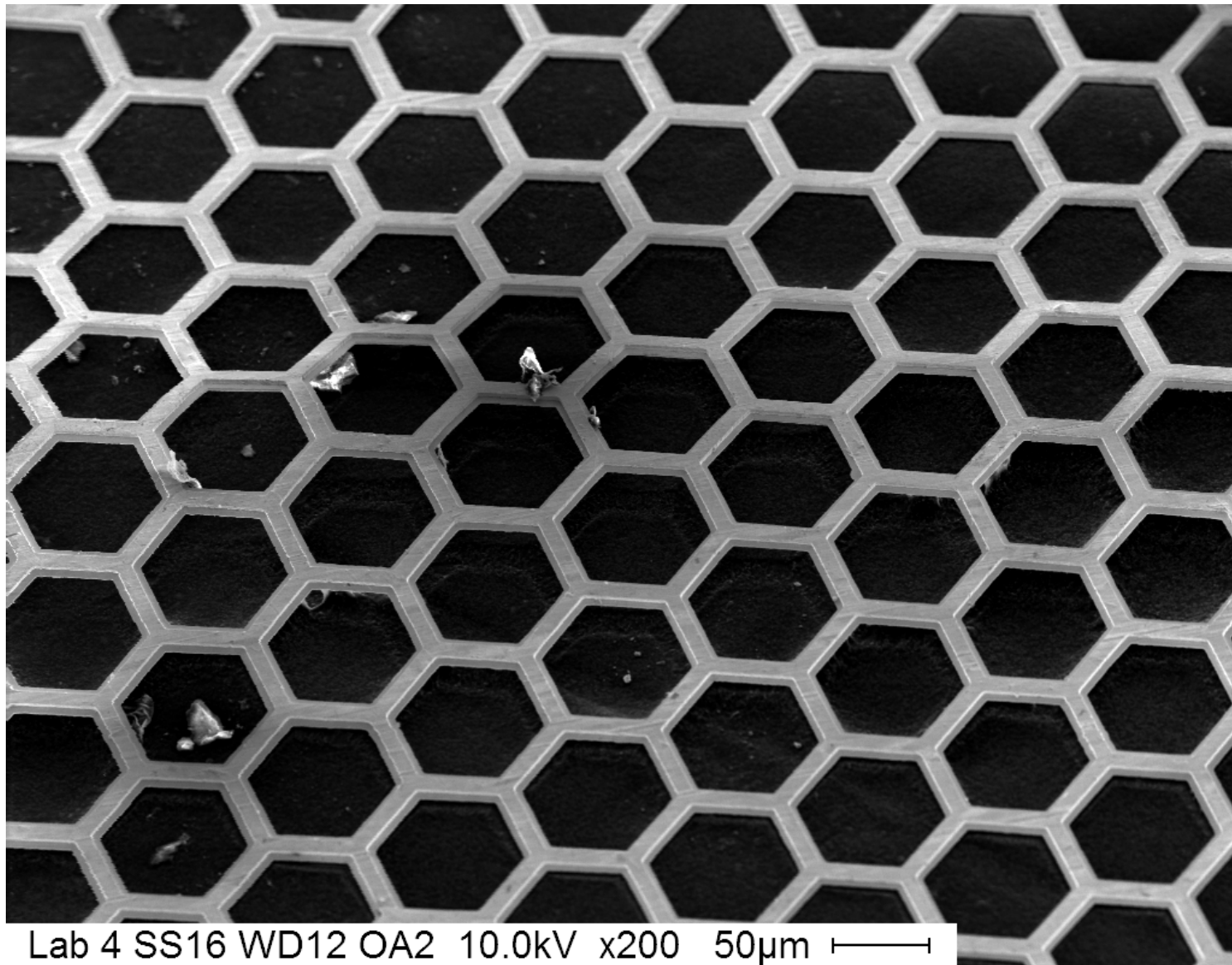


Figure 4a. Image Quality I -Depth of Field. short WD, large aperture. Reduced depth of field. Spot size 16, working distance 12, aperture 2, accelerating voltage 12, 200x magnification. Bar 50um.

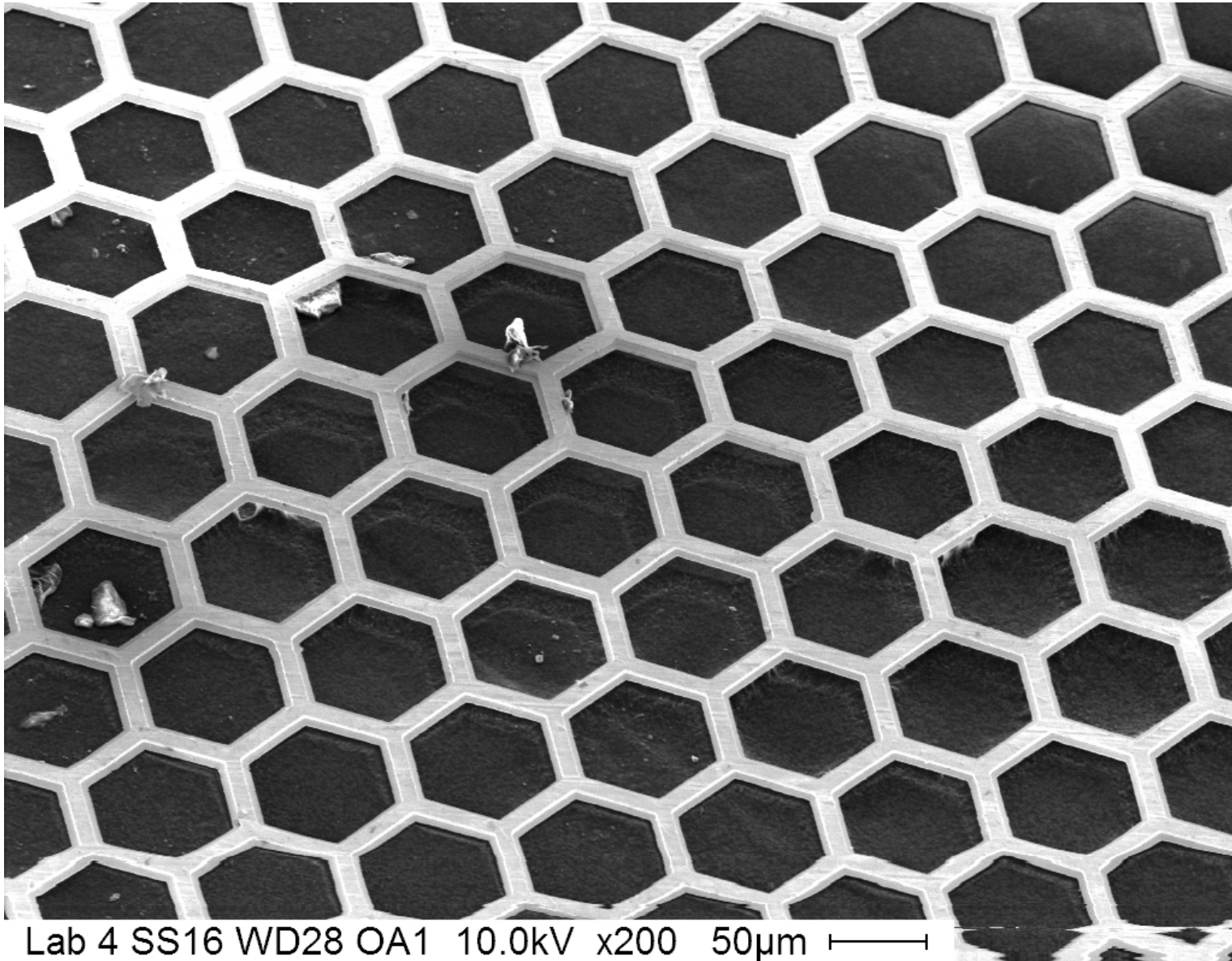


Figure 4b. Image Quality I -Depth of Field. Long WD, small aperture. Solid depth of field. Working distance 28, spot size 28, aperture 1, accelerating voltage 10.0, 200x magnification. Bar 50um.

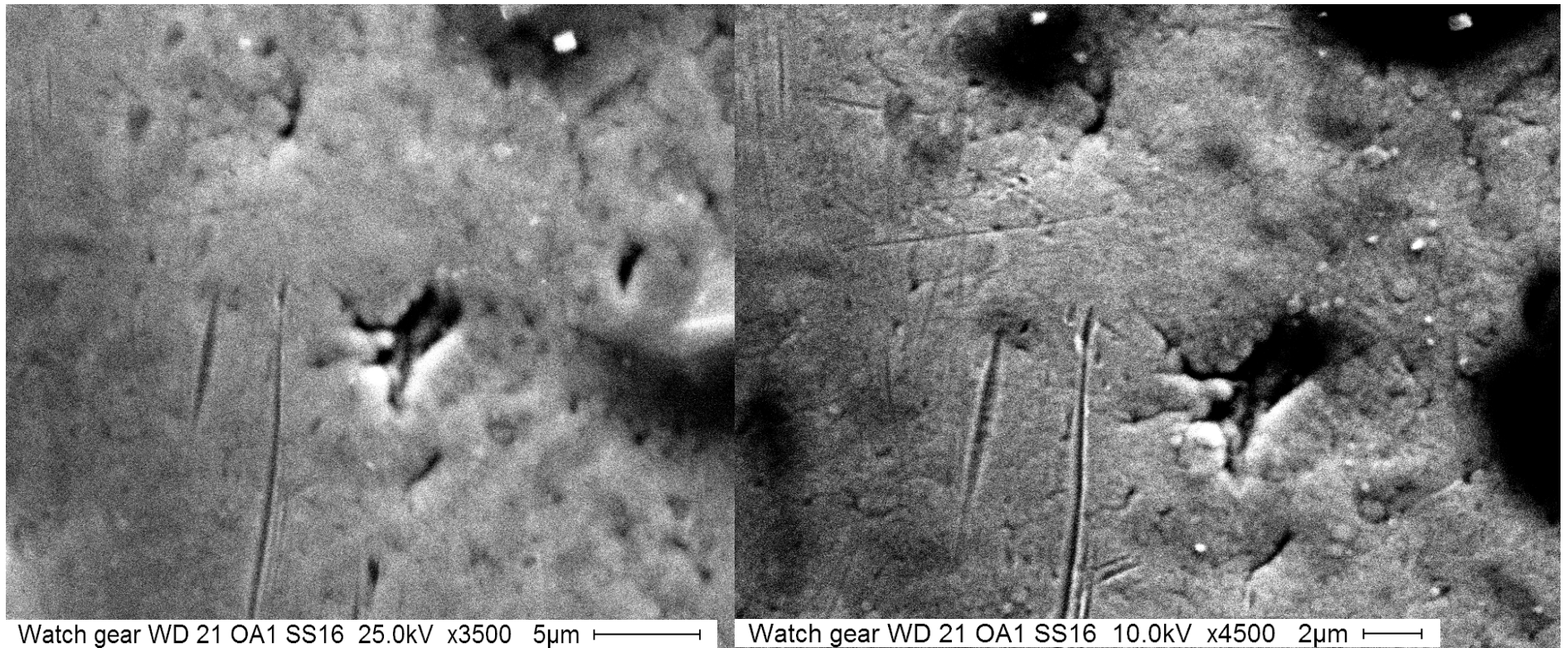


Figure 5. Image Quality II -Accelerating Voltage. A) 25.0 kV; B) 10.0 kV Working distance 21, aperature 1, spot size 16, 3500x (A) 4500x (B) magnification. Bar is 5um (A) 2um (B).

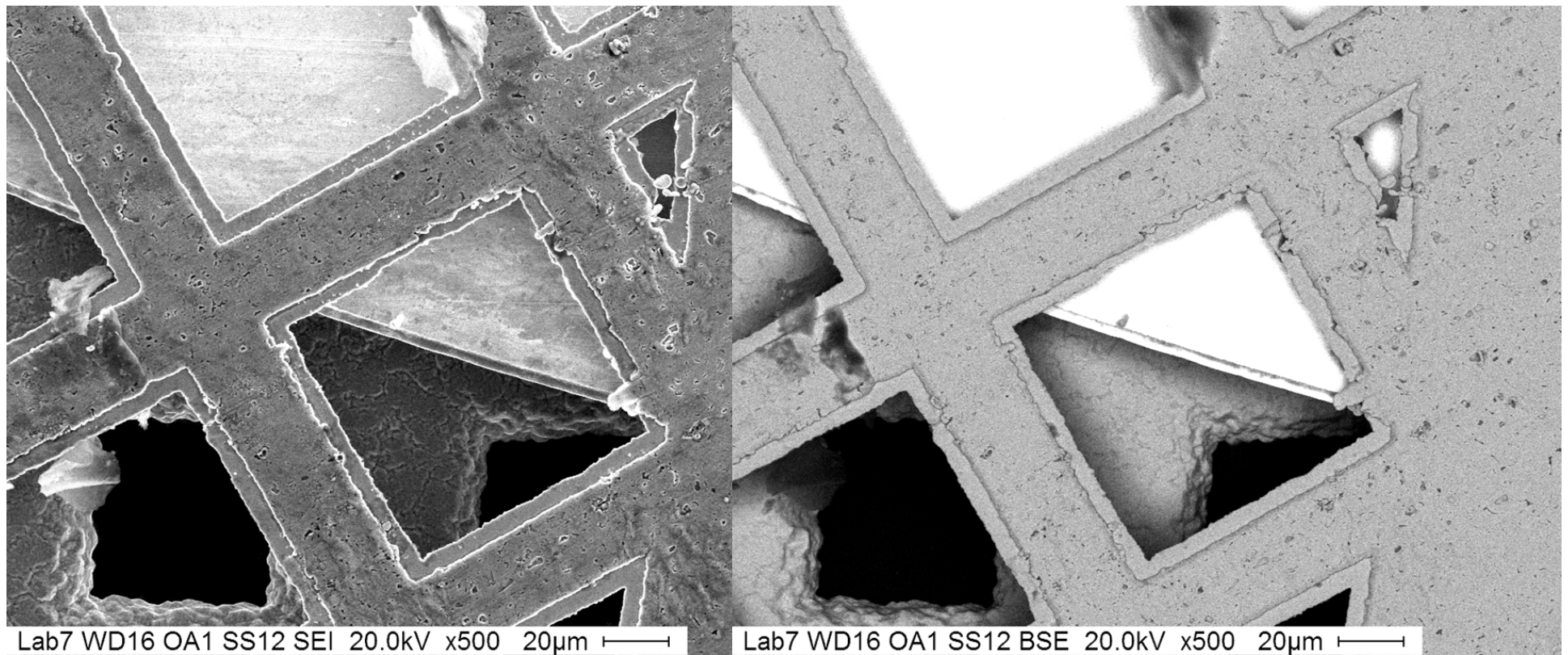


Figure 6. Backscattered Electron Imaging. A) SEI image; B) BEI image. Both images at working distance 16, aperture 1, spot size 12, accelerating voltage 20.0, 500x magnification. Bar 20um.

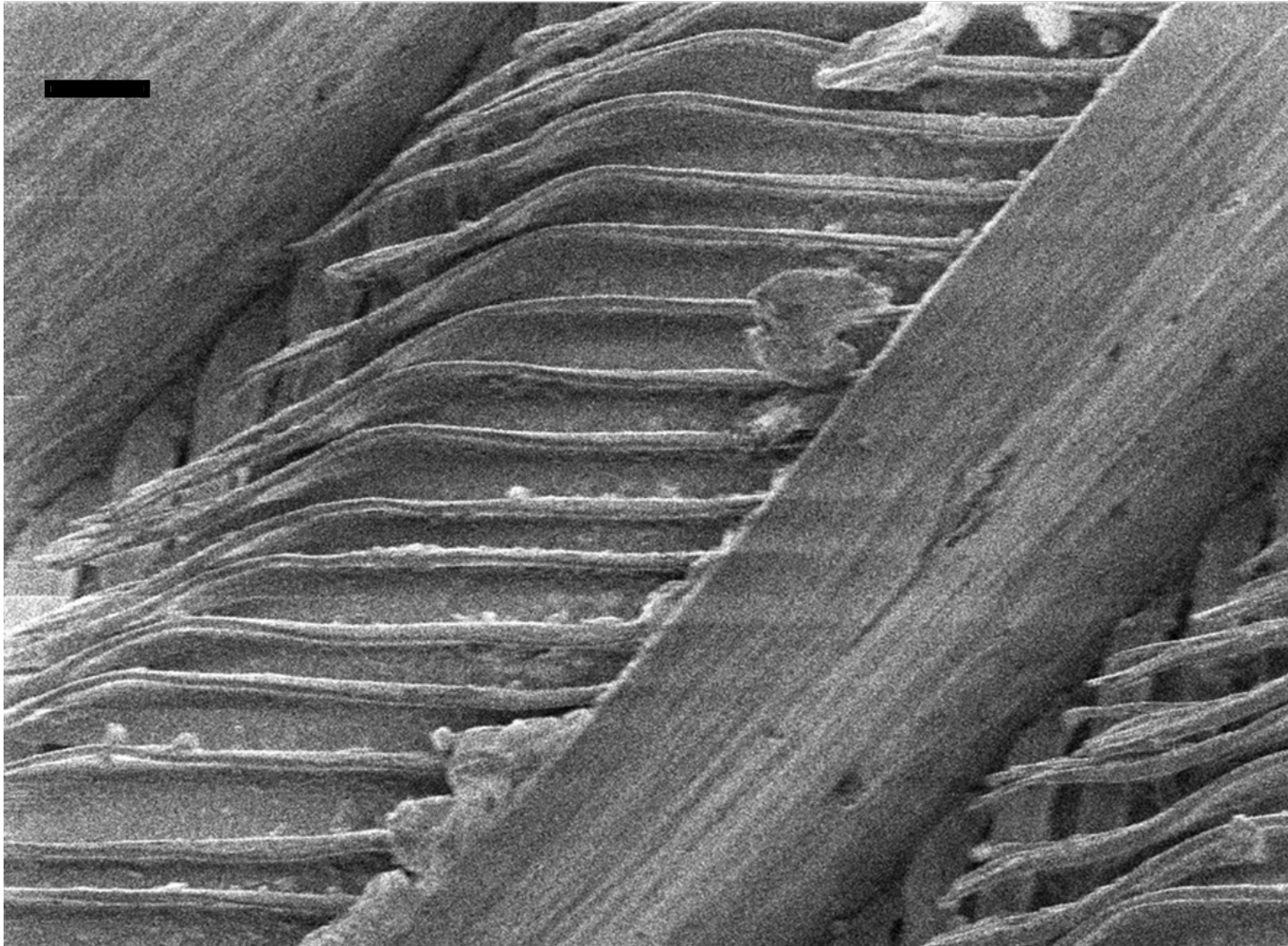


Figure 7. Scanning Electron Micrograph of feather to observe effects of low kV on uncoated biological samples. Micrograph was taken with a working distance of 11.2. Bar = 20 μm , WD = 11.2, Spot size 9, 1.0 kV. 500x.

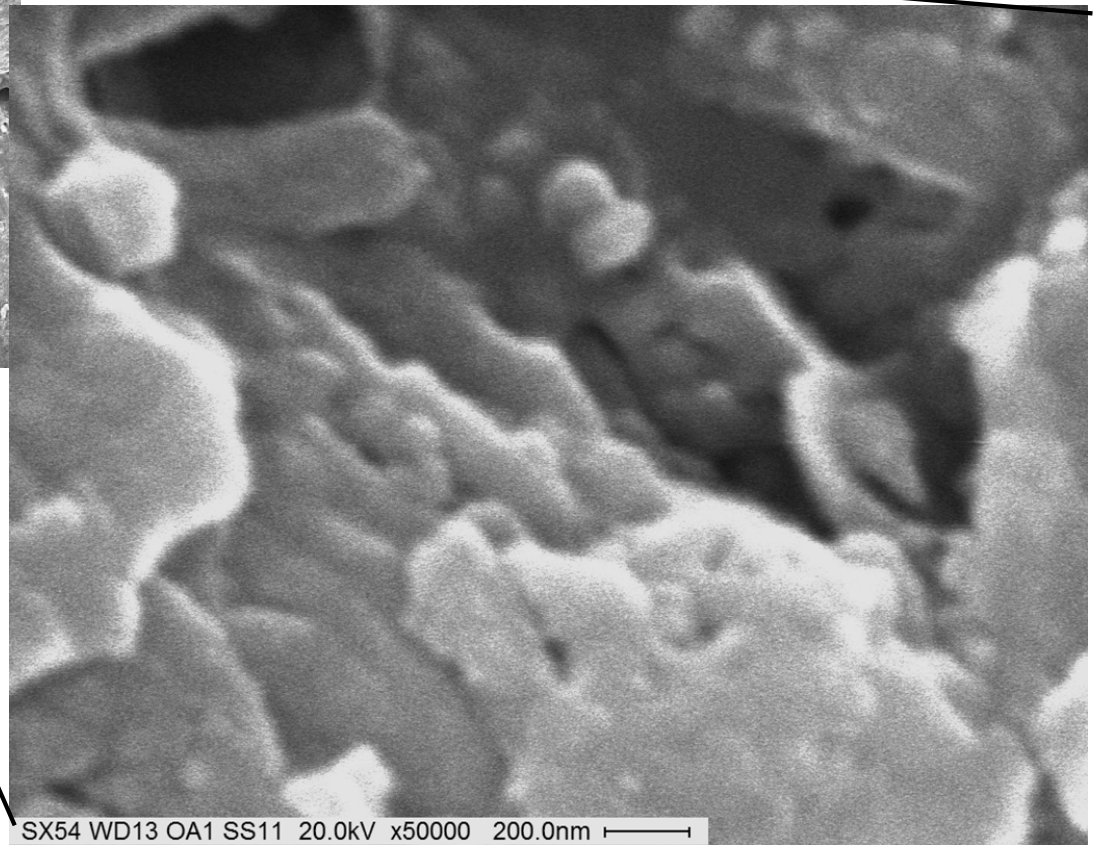
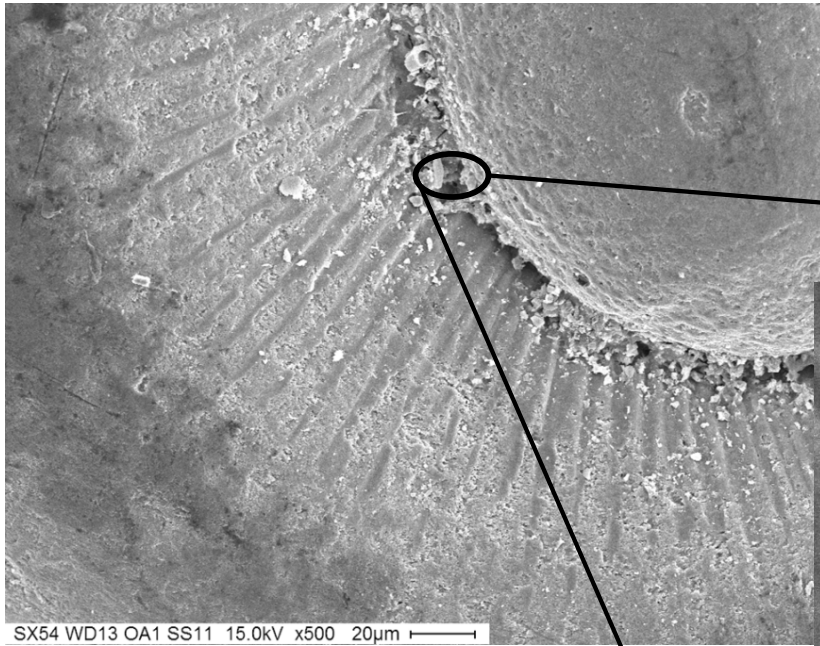


Figure 8. High Magnification of shell to observe effects of high magnification. Micrograph was taken with a working distance of 11. Bar = 20 um, WD = 13, Spot size 11, 15/20 kV. 500x/50000x magnification.

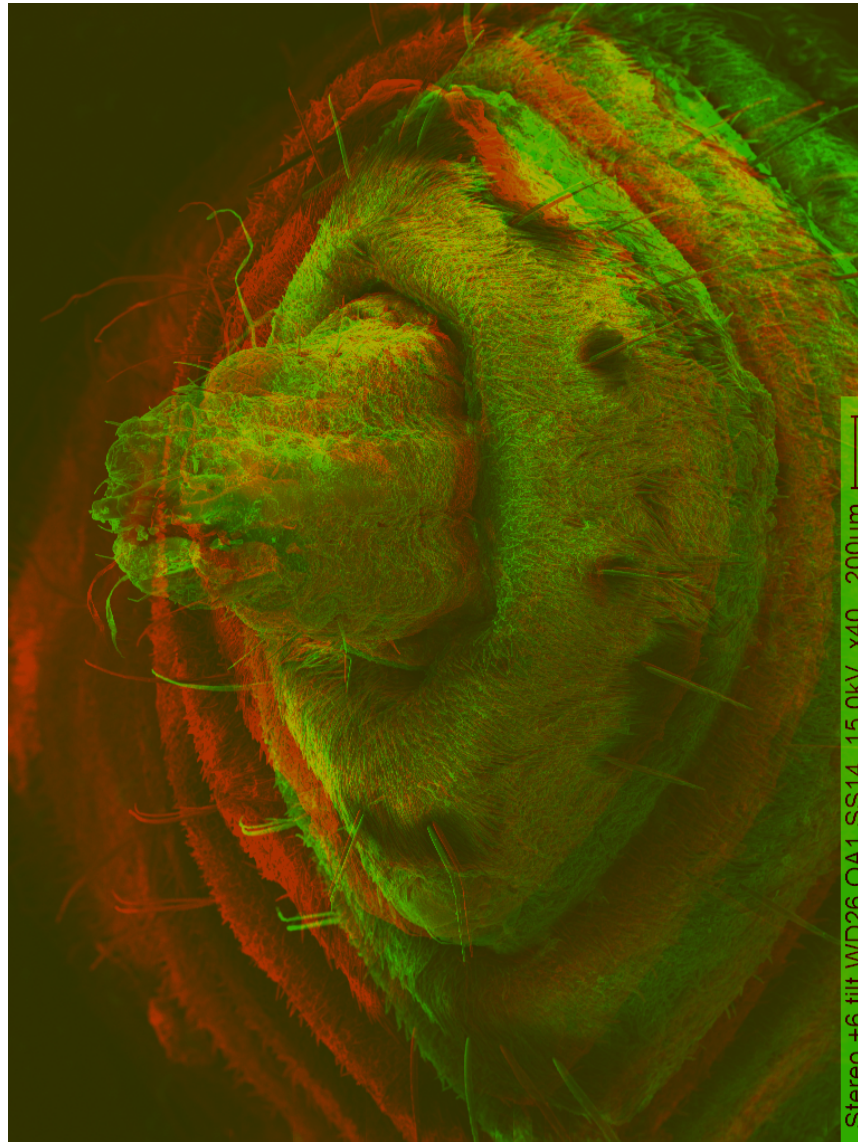


Figure 9. Scanning Electron Micrograph of Hymenopteran posterior at -6/+6 degrees. Image taken at working distance 26, Aperture 1, Spot size 14, 15.0 kV. 40x magnification.