Scanning Electron Microscopy
Portfolio
By Selja Kumar
PART I – SEM TECHNIQUES
Critical Point Drying – Moss fixed in 2.5% glutaraldehyde and dried at different concentrations of ethanol. Coated in gold palladium.
Depth of Field – Sponge spicules coated in gold palladium and looked under a spot size of 16, objective aperture of 1 and working distance of 35 mm
Backscatter – Secondary image of a ring tooth from an octopus; Coated with gold palladium
Backscatter – Ring tooth looked under backscatter composition
Low Voltage Image – Uncoated grass seedhead looked under the conditions of spotsize 8, working distance 9 and objective aperture 1.
High Magnification – Calcium carbonate crystals on sponge spicules coated with gold palladium


**Stereo Pair** – Spicule observed under the conditions of objective aperture 2, working distance 16 mm, spot size 10 and accelerating voltage of 10 kV. The rotation of the images were 88.3° and 100.3°
**Cryofracture** – Succulent that was fixed in 2.5% glutaraldehyde, washed with 0.1M cacodylate buffer, rinsed in series of ethanol, freeze fracture in nitrogen and critical point dried
Aesthetic – Spicules from a sponge coated with gold palladium
PART II – BIOLOGICAL

For this portion of the portfolio, samples of moss, lichen and succulents were fixed in 2.5% glutaraldehyde, washed with 0.1M cacodylate buffer, rinsed with ethanol and then critical point dried. The succulent was cryofractured before critical point drying. This fixation step helps preserve the cell walls and cell structures in these plants. These samples were chosen because of my interest in plant biology and structures that aid the survival of these plants in harsh conditions.
Figure 1: Moss leaves coated with gold palladium
Figure 2: Succulent after critical point drying and being coated with gold palladium
Figure 3: Gametophyte region of moss coated with gold palladium.
Figure 4: Moss and lichen interaction viewed with a coating of gold palladium
PART II – NON-BIOLOGICAL

For the non-biological portion of the portfolio, a broken sterling silver earring, calcium carbonate crystals, a cigarette filter and the paper surrounding the filter was viewed under varying conditions. The cigarette samples were chosen for the reason of viewing how these filters trap chemicals from the cigarette as well as handle the heat released from a burning cigarette. The calcium carbonate crystals were spotted on spicules of sponges. The earring was an interesting subject for viewing under backscatter since to the visible eye, the surface seems smooth but under higher magnification, cracks and dents can be viewed.

The earring was uncoated and viewed directly with backscatter because it is a metal. The calcium carbonate sample and both the cigarette samples were coated with gold palladium.
Figure 1: Backscatter composition image of the end of a sterling silver earring
Figure 2: Cluster of calcium carbonate crystals on the surface of sponge spicules
Figure 3: A thin slice of a cigarette filter
Figure 4: Paper surrounding the filter of a cigarette