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### Low Vacuum SEM Analysis of Biological Sample – Goldenrod Flower

Ebatco NAT Lab has recently added a brand-new, state-of-the-art, low vacuum scanning electron microscope (SEM) to its nano analytical tool set. This JEOL 6610LV SEM is equipped with a large specimen chamber that allows for analysis of a wide variety of samples with sizes and shapes up to 80 mm in height and 200 mm in diameter. Besides, the SEM is also equipped with a convenient eucentric 5-axis motorized stage with automatic tilt and rotation. This stage is very useful for keeping the area of interest in the field of view, particularly for analyzing areas that are offset from the point of rotation.

The most distinguish advantages of the JEOL 6610LV SEM over a conventional SEM are its low vacuum and low voltage operation capabilities. These capabilities make the SEM desirable for analyzing biological and non-conductive samples without sample preparation. By operating at low vacuum, the SEM minimizes or eliminates electric charge built up on non-conductive sample surfaces through chamber gas ionization. By operating at low voltage, the SEM reduces the interaction volume of electrons with the specimen, thus increases the surface specificity and surface sensitivity of the technique. The SEM's low vacuum capability allows for imaging wet, oily, or outgassing samples with ease. It is ideal for analyzing samples whose surfaces are not allowed to be altered, such as museum or forensic samples. With appropriate combination of voltage and vacuum settings, the versatile JEOL 6610LV SEM can capture high resolution images across a magnification range of 5x-300,000x, delivering amazing clarity, revealing finest structures of conducting, non-conducting and biological samples.

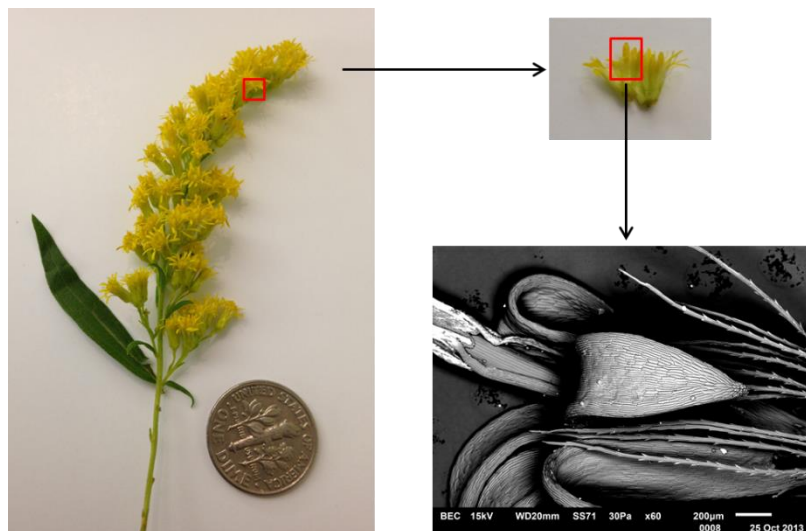


Figure 1. Optical (left and upper right) and SEM (lower right) images of Goldenrod flower petals.



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Goldenrod (*Solidago altissima*), a perennial, North America native flower, blooms in late summer and early fall with bright golden-yellow color flowers (See Figure 1). It beatifies the fields and decorates the landscape. It is, in some places, held as a sign of good luck or good fortune, but mostly regarded as a weed or even unfairly blamed for causing hay fever in humans. Figures 1 and 2 illustrate the micrographs taken on a fresh goldenrod flower with no conductive coating and any other sample pretreatment using the JEOL 6610LV SEM. From Figures 1 and 2, the microstructures of the petal, pistil and pollen can be clearly seen. As indicted on the images, the analytical conditions for these SEM images are 15-25kV in acceleration voltage and 30-200 Pa in vacuum. Proven by the high quality and resolution of these images, it is obvious that the JEOL 6610LV with low vacuum capability is great for microstructural and morphological studies of fresh and untreated biological samples.

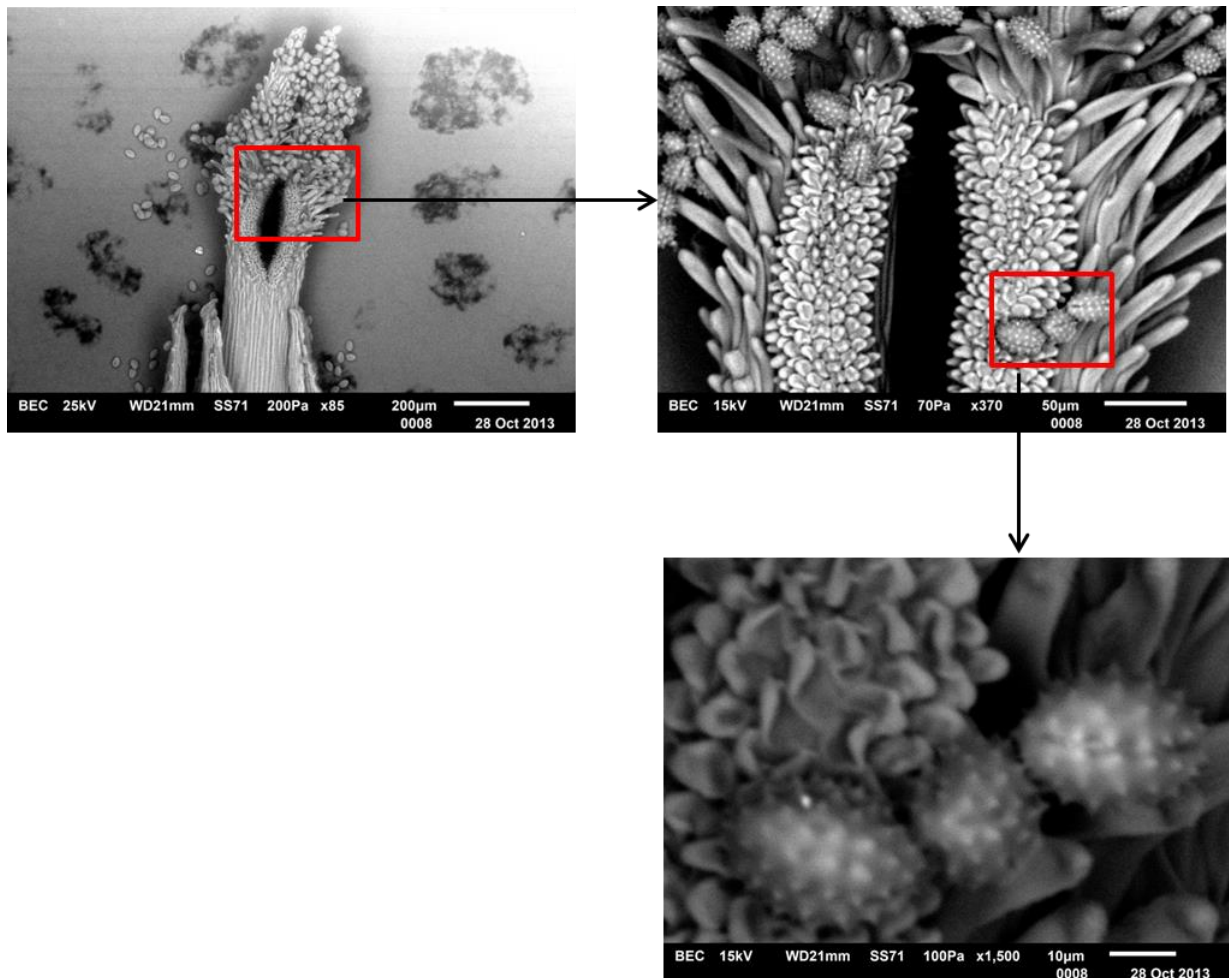


Figure 2. Low vacuum SEM micrographs of the top of a pistil showing cells of a style, and pollen particles on the stigma.