Esther Bullitt, PhD

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Biography:

I have been associated with the Microscopy Society since I was a graduate student, in the early days of cryo-EM. I have served as Biological Director, and as the MSA President. After completing my Ph.D. in David DeRosier's lab at Brandeis University on acrosomal
process bundles of helical filaments in horseshoe crabs and lamprey eels, I completed a postdoc in the Boston University Physics department studying more helical filaments. In a second postdoc and in my own lab at the Boston University School of Medicine, I have used electron tomography of thin sections and cryo-electron tomography to understand the structure and function of yeast spindle pole bodies, virus-infected cells, and vesicles secreted by virus-infected cells.

Research Interests and Presentation Topics:

The research in my lab combines structural biology, biophysics, and biochemistry to focus on a fundamental understanding of bacterial adhesion pili. These pili are micron long helical filaments that are often essential virulence factors for bacteria that cause diarrheal and urinary tract diseases. Using electron microscopy and cryo-EM I discovered that adhesion pili unwind under stress; the forces for unwinding, and rewinding have been measured by collaborators using laser tweezers; and mechanisms of unwinding are being determined by collaborators using steered molecular dynamics based on the structural details we are discovering. Exciting new research is showing the role of saliva in inhibiting diarrheal disease-causing bacteria. We expect that through the direct interaction of saliva with pili, these bacteria are prevented from remaining bound to their target cells long enough to initiate disease.