Imaging Neurons by Cryo-Electron Tomography

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Cryo-electron tomography allows the direct three-dimensional imaging of purified macromolecules, enriched organelles, whole bacterial and archaeal cells, and eukaryotic cellular compartments in a frozen-hydrated state. It's only a matter of time before all biological material is subjected to its investigation. Cryotomograms can be rich with information across length scales spanning a few angstroms to several microns, but extracting all of this information quickly is not easy given the potential variation in their content and complexity. Here I will talk about how we're applying cryo-electron tomography, live cell imaging, and deep learning to investigate complex cytoskeletal networks within neurons at the nano-scale, and how we're moving toward analyzing whole neuronal cytoskeletons.