Structure and assembly of membrane proteins in native membranes by atomic force microscopy (AFM)

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The atomic force microscope (AFM) has become a powerful tool in structural biology allowing the investigation of biological samples under native-like conditions: experiments are performed in physiological buffer at room temperature and under normal pressure. Topographies of membrane proteins can be acquired at a lateral resolution of ~10Å and a vertical resolution of ~1Å. Importantly, the AFM features an extraordinary signal-to-noise ratio allowing imaging of individual membrane proteins in prokaryotic [1] and eukaryotic [2] native membranes that participate in supramolecular assemblies. These images can be docked with high precision by high-resolution structures resulting in atomic models of multiple proteins working together. The development of a novel 2-chamber AFM setup, in which membranes are deposited on nano-patterned surfaces, allows probing non-supported functional membrane proteins [3].

1) Chromatic adaptation of photosynthetic membranes.
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2) The supramolecular architecture of junctional microdomains in native lens membranes.
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3) 2-Chamber-AFM: Probing Membrane Proteins Separating Two Aqueous Compartments.
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