Chez Pierre

Presents ...

Wednesday, February 13, 2013
10:00am
MIT Room 4-331

SPECIAL CHEZ PIERRE SEMINAR

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"Lipid bilayers, sweetened: In vitro experiments reveal extracellular glycans pattern the phase behavior of lipid membranes"

Hydrated networks of glycans (polysaccharides) in the form of cell walls, periplasms or gel-like matrices are ubiquitously present adjacent to cellular plasma membranes. Yet despite their abundance, the function of glycans in the extracellular milieu is largely unknown. I show that glycans as part of hydrated networks can interact directly with lipids in model membranes. Because of this interaction, the spatial configuration of the glycans controls the phase behaviour of multiphase lipid membranes: inhomogeneous glycan networks stabilize large lipid domains at the characteristic length scale of the network, while homogeneous glycan networks suppress macroscopic lipid phase separation. I find that glycans pattern the phase separation of lipids due to a preference for ordered lipid phases, and that the patterning is thermally reversible. The discovery here that glycan networks can control the length scale of domains in adjacent lipid membranes necessarily has implications for plasma membrane mediated transport processes and potentially rationalizes some long-standing puzzling observations that differentiate the behaviour of native plasma membranes and model membranes. I will close by providing perspectives on future avenues of research.