

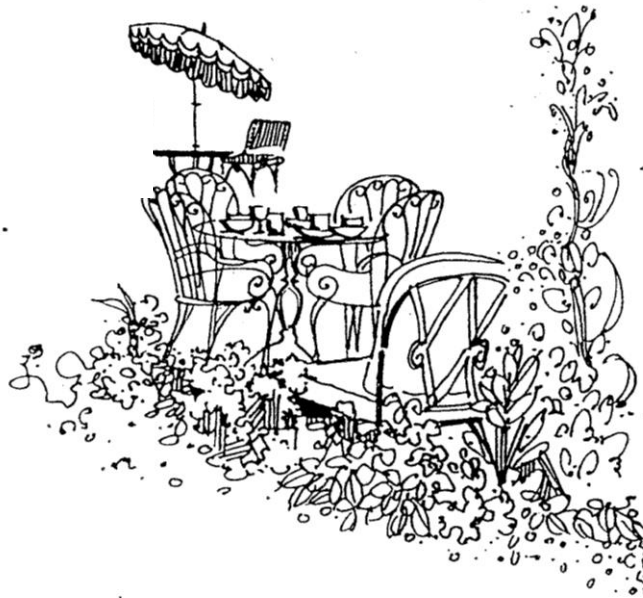
Chez Pierre

Presents ...

Monday, March 14, 2011

12:00pm

MIT Room 4-331



SPECIAL CHEZ PIERRE SEMINAR

M. Lisa Manning
Princeton University

"How Does Surface Tension Emerge From Structure in Biological Tissues?"

Developing animal tissues behave like fluids on long timescales and possess a characteristic surface tension that can be measured experimentally. Cell rearrangements in these tissues closely resemble the behavior of immiscible liquids governed by their surface tensions. But individual cells are not equivalent to molecules in a fluid; cells resist shape changes and modulate adhesive contacts with neighbors in tightly packed, disordered structures. I will discuss a minimal model, based on feedback between mechanical energy and cellular structure, that successfully explains past experimental data and makes novel predictions about the shapes of cells at the tissue surface, which we verify in zebrafish embryonic tissues. This model specifies how the collective property of surface tension emerges from properties of individual cells such as cell-cell adhesion and "cortical tension". I will discuss the implications of this model for tissue organization, and highlight open questions about the relationship between local structure and cell rearrangements in these disordered, active materials. I will also discuss related work that provides insight into the basic physics of particle rearrangements in glassy, non-biological materials.