Joint Physical/Chemical Biology Seminar

Tuesday, November 16, 2010 | **11:00 a.m.** | **Room 1315 Chemistry Building**

Bacterial Biofilms and Host Defense Peptides: From Search Engines of Bacterial Social Behavior to Design Rules for Antimicrobials

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One of the unsolved problems in human health and disease is the control of pathogens, such as antibiotic-resistant forms of bacteria. In this talk, we will briefly describe two vignettes where physics-based approaches have been useful.

1) Bacterial biofilms are structured multicellular communities that are notoriously resistant to antibiotics. By adapting algorithms from colloid physics, we translate bacteria movies into searchable databases of bacterial behavior and find new appendage-specific mechanisms for *P. aeruginosa* surface motility, including a new motility mode in which bacteria stand upright on a surface and 'walk' using type IV pili, in order to optimize surface exploration.
2) The mechanism of mammalian defensins (a family of host defense peptides) and the mechanism of the Bcl2 (a family of apoptosis proteins) are investigated from a topological standpoint. We show it is possible to use soft matter physics to construct a set of amino acid sequence design rules for new antimicrobials that punch holes in bacterial membranes, and to construct new proteins that potentially turn on suicide signals in cancer cells.

Refreshments will be available prior to the seminar at 10:45 a.m. outside room 1315

Graduate Students may meet with the speaker at 1:00 p.m. in Room 8335