

Department of Biological Sciences  
Structural Biology & Proteomics Seminar Series  
**Seminar Announcement**

---

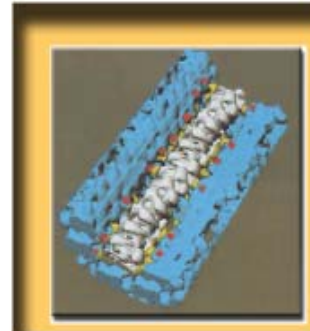
# A third type of actin-based cellular engine, an actin spring

## Paul Matsudaira

Member, Whitehead Institute  
Professor of Bioengineering and Biology  
Dept of Biology and Div. of Biological Engineering, MIT  
Director, WI-MIT Biolmaging Center



Cellular engines power large  $\mu\text{m}$ -scale movements such as organelle transport, cell motility, and chromosome separation by either a molecular motor-based or polymerization-based mechanism. However, the fastest, furthest, and most powerful movements are based on protein polymers that store and expend energy as biological springs (Science 288:95 (2000)). One model for studying spring-based cellular engines is the horseshoe crab sperm acrosomal process. A bundle of actin filaments is stored as a coil around the base of the sperm cell. When activated by contact with the egg jellycoat, the bundle uncoils and extends 60  $\mu\text{m}$  in five seconds. To penetrate the jelly coat the acrosomal process exerts nNs of force and generates several GPa of pressure. The seminar will discuss how energy is stored as a conformational change in actin filaments, the mechanics of force generation, the 9Å structure of the bundle (Nature, *in press*), the material properties of actin bundles (Science 304:1301 (2004)), and the molecular cell biology of actin filament conformation changes.



**Date: Friday, 6 August 2004**

**Time: 4:00 pm**

**Venue: LT 20**

**Host: Prof Hew Choy Leong**



**All are welcome**