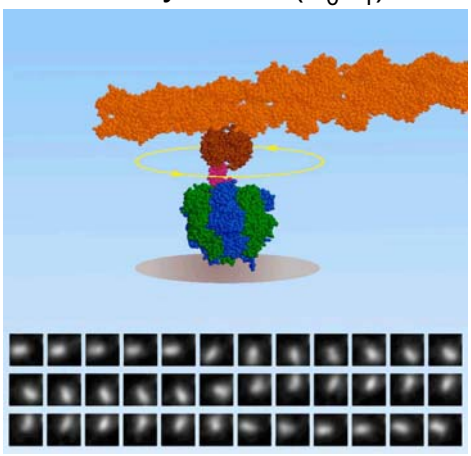
Motor Proteins

Mechanochemical (Enzyme) *Engines*

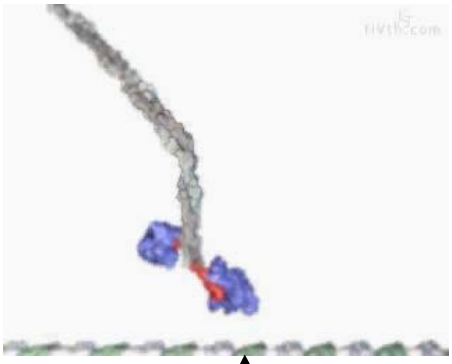
ATP hydrolysis->conformation change

Rotary Motor (F_0F_1)



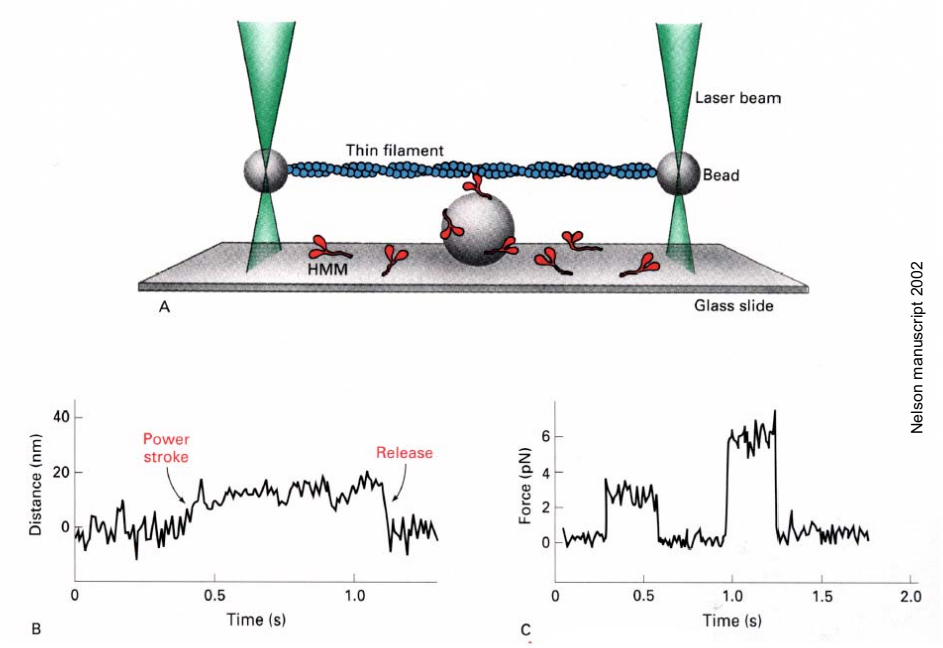
Yanagida 1999

Linear Motor Myosin II



Actin filament

Motor Proteins



Nelson manuscript 2002

Reoccurring Themes in Biomechanics

- Multiple length/time/energy scales
- Polymers play an important role
- Thermal energy is important
- Interplay of chemical, electrical, mechanical interactions
- Quantitative (single molecule) experiments

Molecular, Cellular & Tissue Biomechanics

Biology is soft, wet & dynamic

Using Engineering/Physics to Unravel & Manipulate Biology

- Scaling arguments
- Mechanical models (polymer physics)
- Experimental techniques
- Importance of the stochastic nature of biology

Readings

There is no single text which covers all of this material !

Texts:

Y. C. Fung, **Biomechanics: Mechanical Properties of Living Tissues**, 2nd Edition, Springer -Verlag, 1993R. Nossal and L. Lecar, **Molecular and Cellular Biophysics,** Wiley, 1990.H. Lodish, D. Baltimore, L. Zipurksy, P. Matsudaira, **Molecular Cell Biology**, 1996. K. Dill and S. Bromberg, **Molecular Driving Forces**, 2003

Manuscript Drafts:
P.C. Nelson, Biological Physics: Energy, Information Life
A. Grodzinksy, R. Kamm, L. Mahadevan: BEH 410

Research Articles:
Posted/linked on the web

Notes:
Periodically posted

Further Information

Guest Lectures:
- 3/10: Matthew Lang (ME, BE)
- 4/14: Alan Grodzinsky (EECS, BE)
- 5/5: Peter So (ME, BE)

Website: http://stellar.mit.edu/S/course/BEH/sp03/beh.410

- updated regularly
- readings
- handouts