Phases of Cell Migration

- Polarization
- Protrusion and adhesion
- Contraction
- Rear release

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Staining for actin (green) and myosin II (red) in a migrating cell.

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Yellow indicates the location of myosin II tethered to the actin matrix in a migrating cell.

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Actin polymerization generally occurs at the protruding membrane of a migrating cell.

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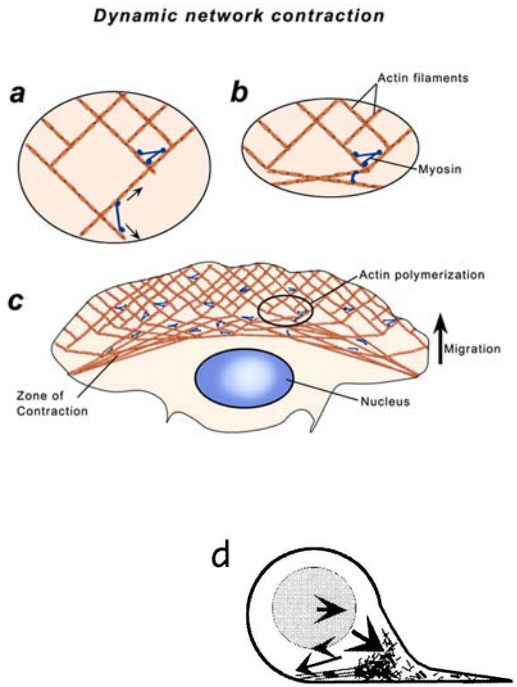
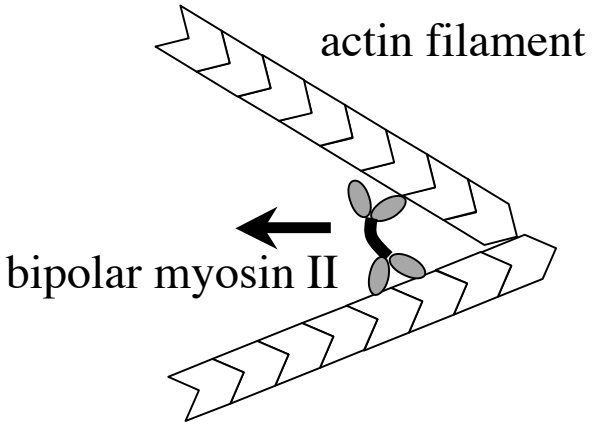
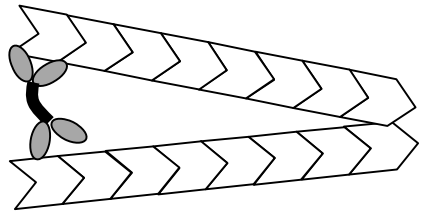
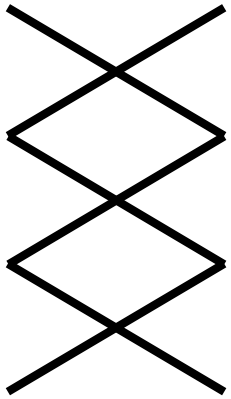
See Figure 1 in Pollard, T. D., and G. G. Borisy.
"Cellular Motility Driven by Assembly and Disassembly of Actin Filaments."
Cell 112: 453-465 (21 Feb 2003).

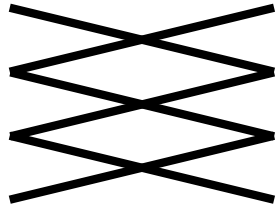
One scenario for how myosin movement along the actin matrix can give rise to matrix contraction.



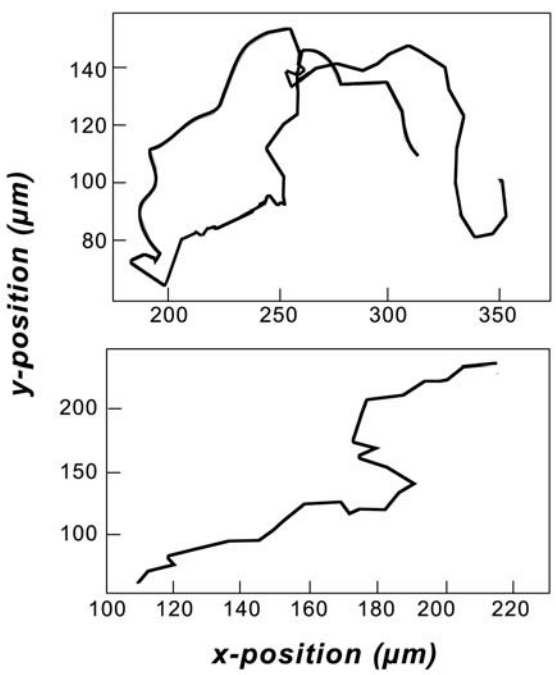


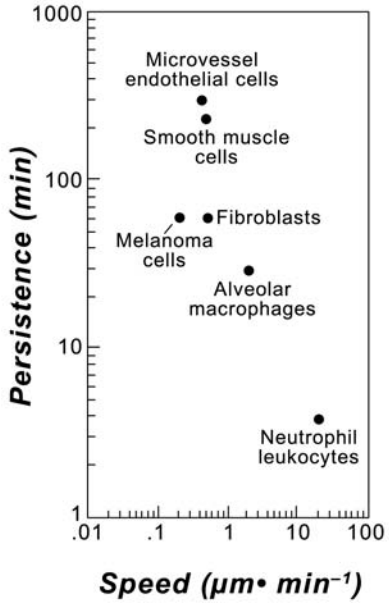




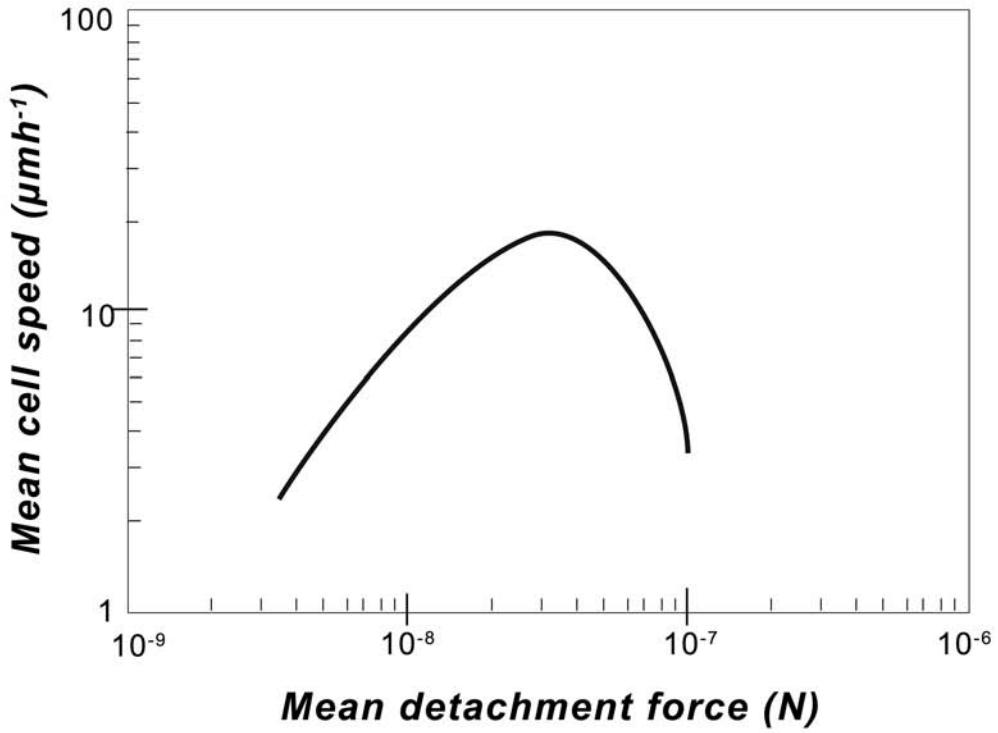


Cell migration patterns. In the absence of an external signal (e.g., chemoattractant gradient), the migration pattern resembles a random walk.





Migration speed tends to vary inversely with persistence time.



Migration speed first increases, then falls as the strength of attachment is increased.

Cilia

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Cilia beating on the surface of
an airway epithelial cell.