



Cell migration on chemically and topographically modified surfaces

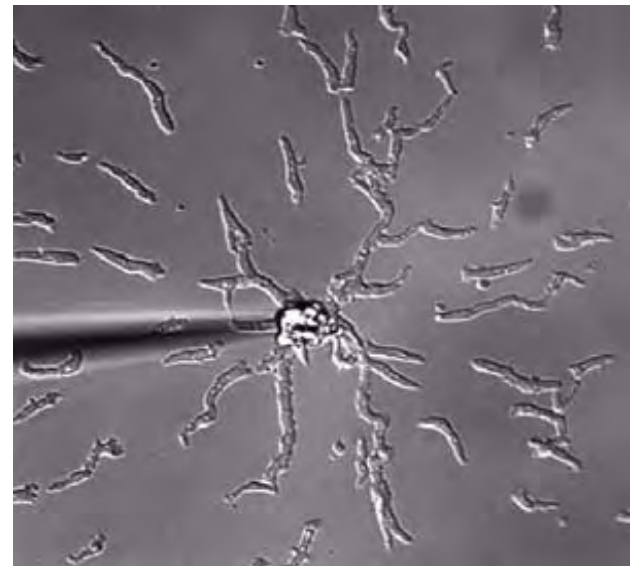
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Background – *D. discoideum*

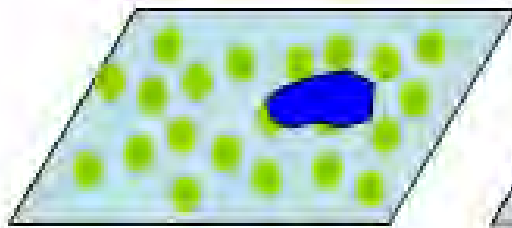
- Single celled organisms that can form groups to move
- Move by chemotaxis
- Signaling causes cells to form streams



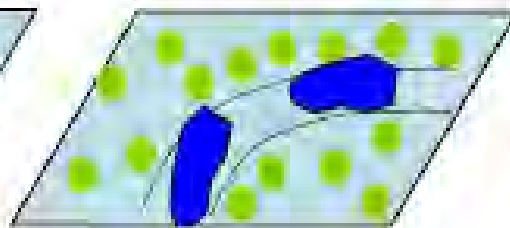
Aggregation of *D. discoideum* cells in response to a chemical signal.

Objective

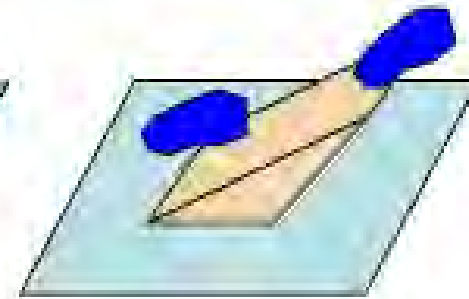
- To guide cell motion through varied nanotopography and cell-scale topography



**Nanopatterned
Surface**



**Structured,
nanopatterned
surface**



**Large scale
topography:
Cliff**

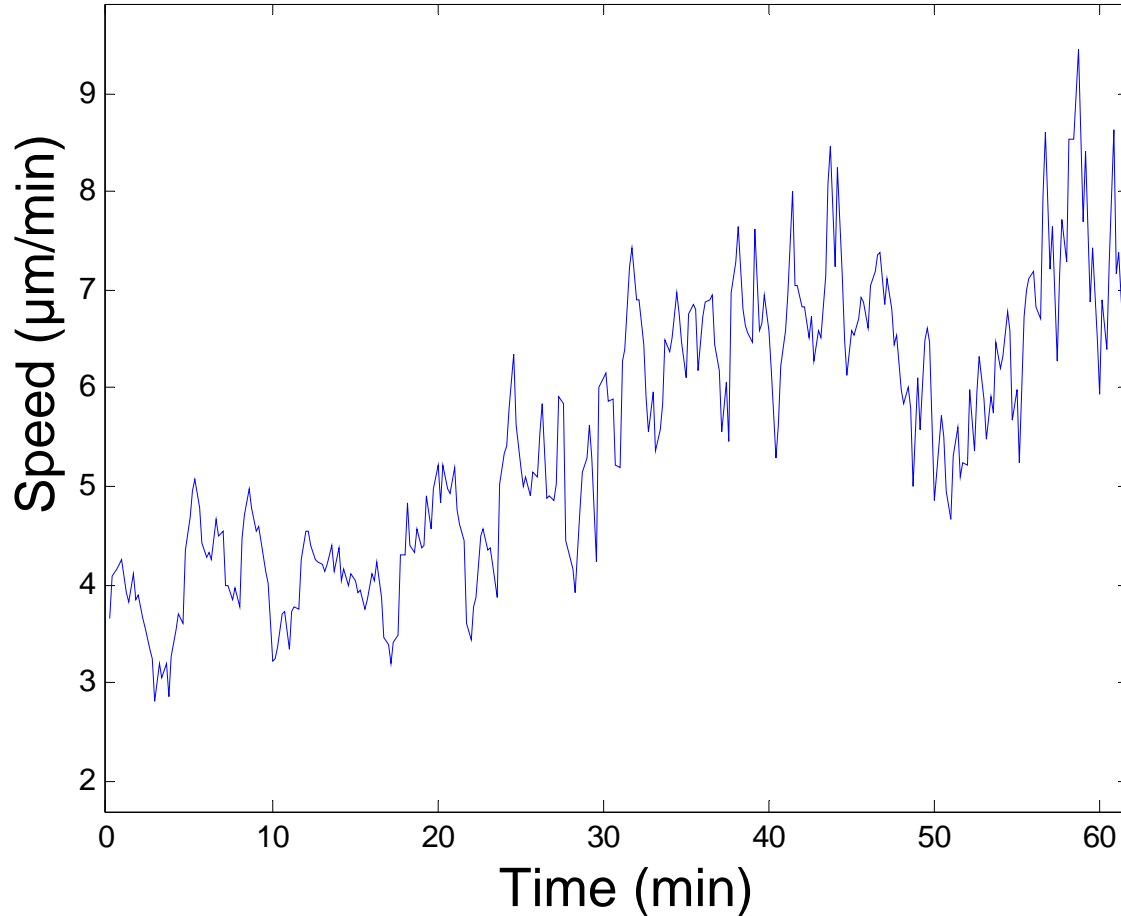


Do cells have a sense of touch?



Calculating cell speed

**Speed vs. Time on 1.5hr
gold nanoparticle treatment**

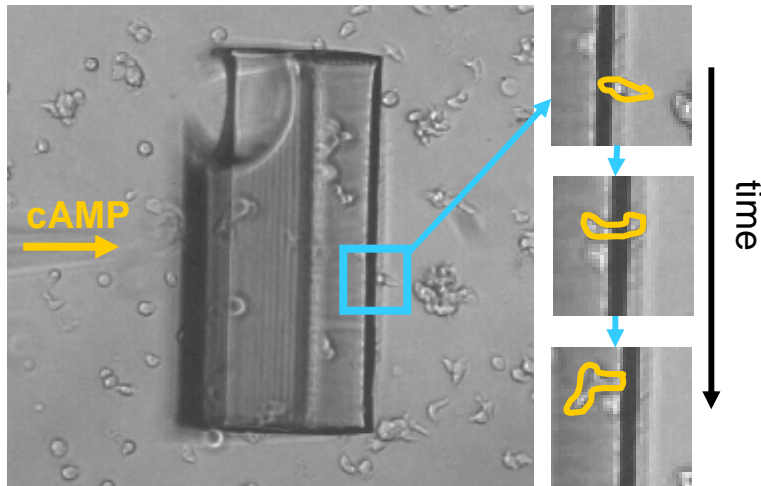
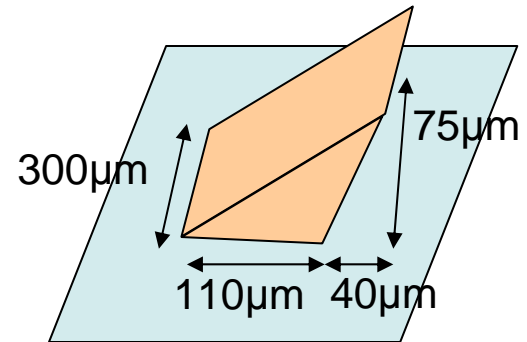


**Average cell speed
(µm/min) on gold
nanoparticle-coated
surfaces**

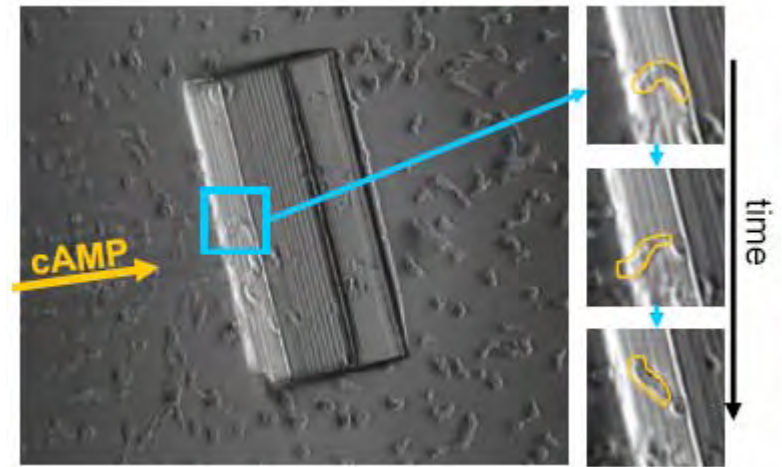
1.5hr gold nanoparticle treated	7.20
2hr gold nanoparticle treated	8.99

Cell-scale topography

- Micro-scale overhang ramp
- Made of acrylic resin

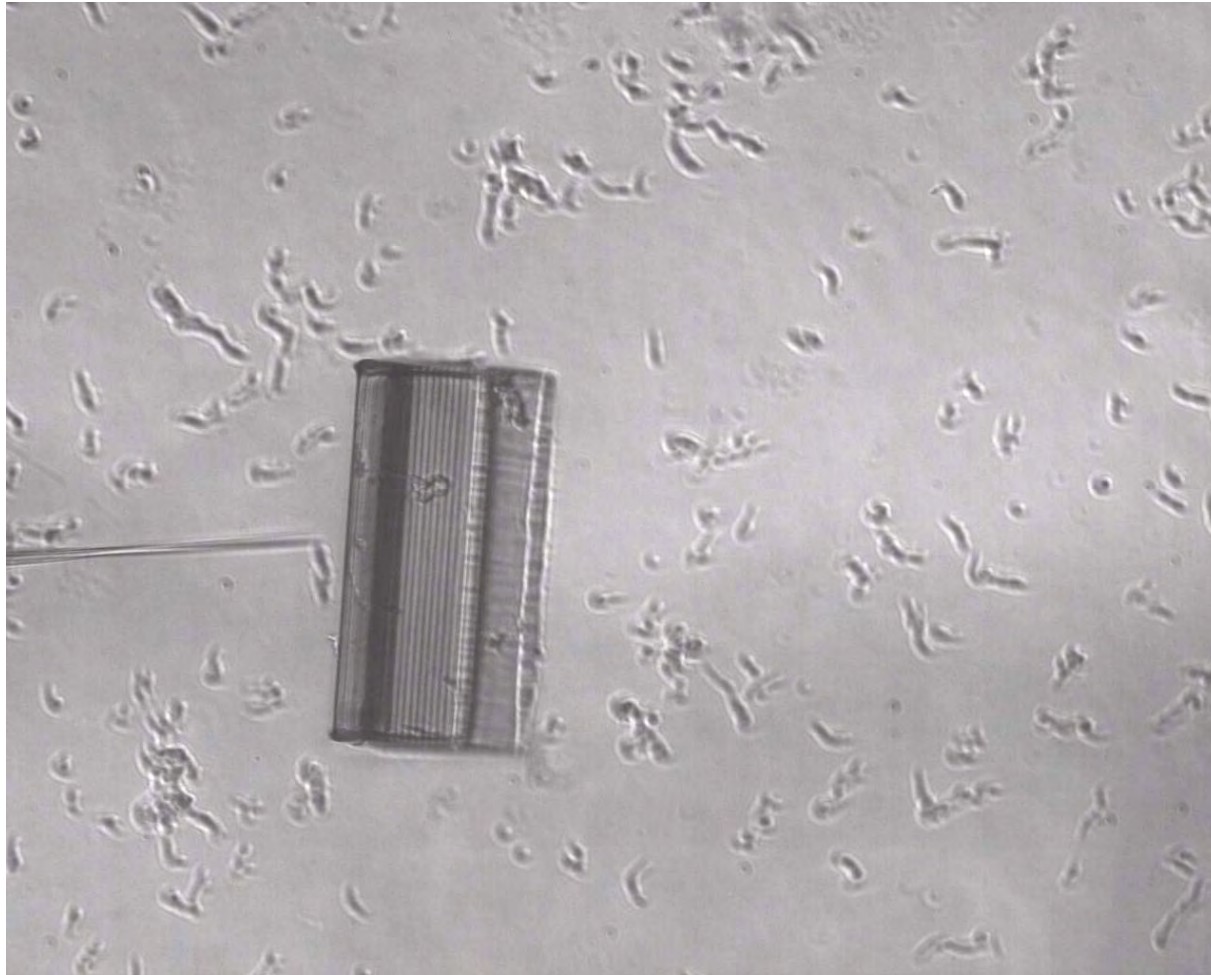


A cell crawls from the flattened resin onto the ramp.



A cell moves over the top ledge of the ramp and then begins to crawl back down the ramp.

Will cells fall off a cliff?



Cell speed ($\mu\text{m}/\text{min}$) on resin surfaces

PDMS-flattened resin	12.60
Ethylenediamine-coated PDMS-flattened resin	12.94