Project Title
Project Subtitle
Document Title

Author

Department
Institution

DRAFT

09:24 GMT - 22nd of February, 2019

Outline

DRAFT: NOTES

- Write sections

Outline

A section

"Movement of a motile cell or organism, or part of one, in a direction corresponding to a gradient of increasing or decreasing concentration of a particular substance."

- Directed movement of cells tends to be in response to signalling molecules, released by other cells in minuscule amounts
  - E.g. Development of tissue and organs, Immune system cell response to pathogens

Do cells respond in a similar way to electrical fields?

Subsection

E.g. E. Coli 'run and tumble' motion

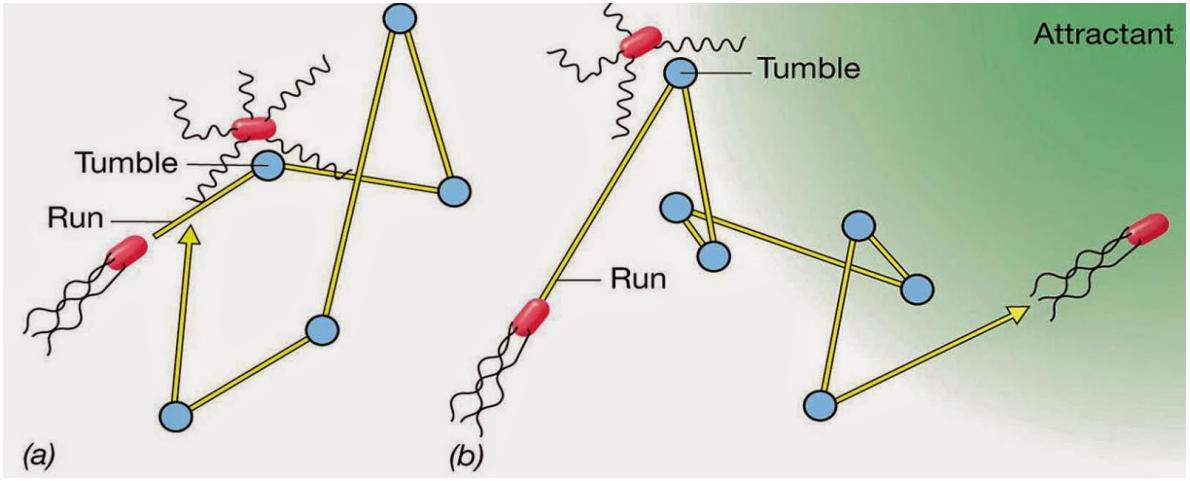


Figure: E. Coli chemotaxis

- Cell swims in a direction and randomly change direction after 'tumbling' at random times
  - Direction chosen is biased towards positive nutrient gradients

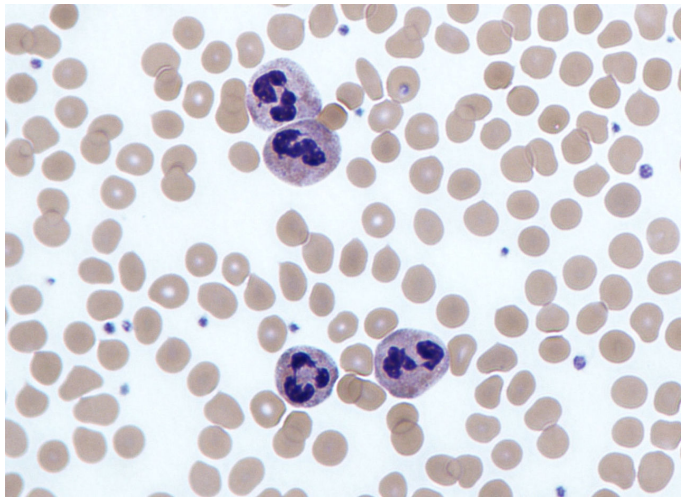
Source: http://biologicalexceptions.blogspot.co.uk/2014/09/

THINGS TO TALK ABOUT :

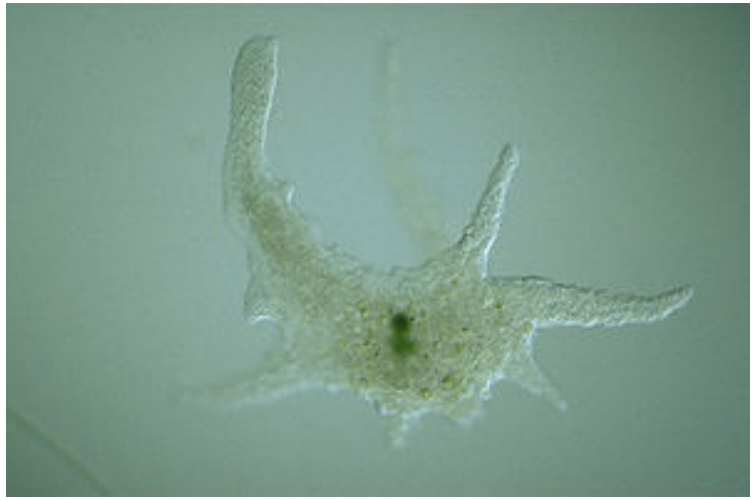
- CELLS AND STUFF
- E.COLI AND RUN-AND-TUMBLE

Another subsection

But not all motile cells have flagella..



(a) White blood cells

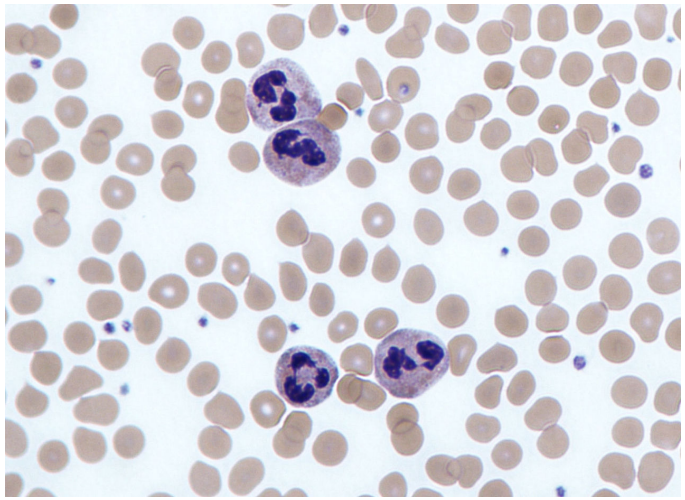


(b) Amoeba

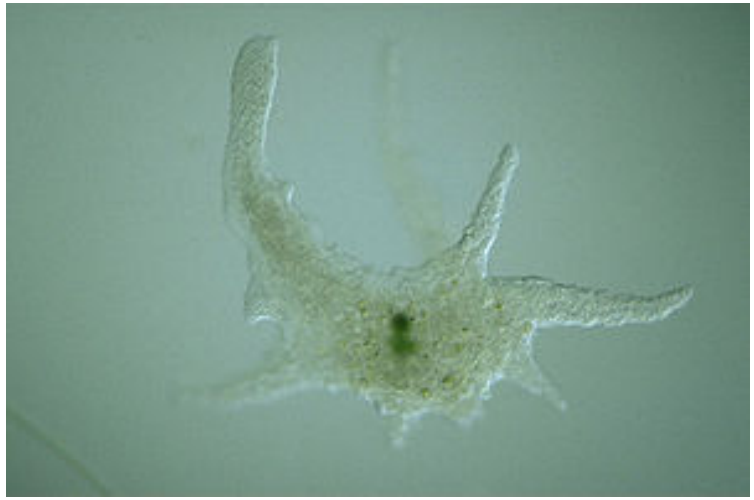
Source: Wikipedia entries, *Neutrophil*, and *Chaos (genus)*,
`https://en.wikipedia.org/wiki/File:Neutrophils.jpg`
`https://en.wikipedia.org/wiki/File:Chaos_carolinense.jpg`

Differently named frame

But not all motile cells have flagella..



(a) White blood cells



(b) Amoeba

Source: Wikipedia entries, *Neutrophil*, and *Chaos (genus)*,
`https://en.wikipedia.org/wiki/File:Neutrophils.jpg`
`https://en.wikipedia.org/wiki/File:Chaos_carolinense.jpg`

Outline

Yet another subsection

Let $\{\boldsymbol{r}_1, ..., \boldsymbol{r}_n\}$ be positions of nodes on cell surface and let $\mathcal{N}_i(t)$ denote the neighbouring nodes of node i at time t.

Assume inertial terms are small enough to be inconsequential compared to dissipative terms in equation of motion:

$$\eta \frac{d\boldsymbol{r}_i}{dt} = \boldsymbol{B}_i(t) + \sum_{j \in \mathcal{N}_i(t)} \boldsymbol{F}_{ij}(t),$$

where η is a drag coefficient, $\boldsymbol{F}_{ij}$ denotes the force on node i from node j and $\boldsymbol{B}_i(t)$ is the sum of other forces on node i at time t.

References

Buzsáki, G., C. A. Anastassiou, and C. Koch
2012. The origin of extracellular fields and currents-EEG, ECoG, LFP and spikes. *Nature Reviews Neuroscience*, 13(6):407–420.

Niedermeyer, E.
1972. *The generalized epilepsies: a clinical electroencephalographic study*. Charles C. Thomas Publisher.

Thank you for your time!

Backup slide

Backup stuff