

EVOLUTIONARY DYNAMICS

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Evolution is the unifying theme of biology. As Theodosius Dobzhanski said, nothing in biology makes sense if not seen in the light of evolution. Evolutionary dynamics can be formulated in terms of mathematical equations describing how populations of reproducing individuals change under mutation and selection. I will describe basic principles of evolutionary dynamics including stochastic and deterministic processes, ranging from well-mixed, homogeneous populations to evolutionary graph theory. I will discuss quasi-species theory, error-thresholds and evolutionary game theory. Applications include the evolution of genomes, infectious agents, cancer, altruistic behavior and human language.

Further reading:

- Nowak M.A., Sasaki A., Taylor C. & Fudenberg D., Emergence of cooperation and evolutionary stability in finite populations, *Nature*, 428 (2004), 646-650.
- Nowak M.A. & Sigmund K., Evolutionary Dynamics of Biological Games, *Science*, 303 (2004), 793-799.
- Michor F., Iwasa Y. & Nowak M.A., Dynamics of Cancer Progression, *Nature Reviews Cancer*, 4 (2004), 197-205.

More information can be found on: www.ped.fas.harvard.edu