



PRINCIPLES OF SYSTEMS BIOLOGY AND THEIR APPLICATION TO CELLS

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This talk will outline some of the principles of the systems approach to biology (Noble 2008) to show that our ideas of gene causation need revising (Noble 2008) if we are to succeed in understanding the relations between genomes and phenotypes. I will also explain why neo-Darwinian theories of evolution need revising (Shapiro 2009; Noble 2010). As Barbara McClintock (1984) showed, the genome is better regarded as an organ of the cell rather than its program. I will use simulation of cardiac cells to illustrate some of these principles with concrete examples.

McClintock, B. (1984). "The significance of responses of the genome to challenge." Science **226**: 792-801.

Noble, D. (2008). "Claude Bernard, the first Systems Biologist, and the future of Physiology." Experimental Physiology **93**: 16-26.

Noble, D. (2008). "Genes and Causation." Philosophical Transactions of the Royal Society A **366**: 3001-3015.

Noble, D. (2010). "Biophysics and Systems Biology." Philosophical Transactions of the Royal Society A **368**: 1125-1139.

Shapiro, J. A. (2009). "Revisiting the Central Dogma in the 21st Century." Annals of the New York Academy of Sciences **1178**: 6-28.