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**Spatially-Extended Cellular Signals - The Case of Chemotaxis**

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Many models of cellular signal processing treat the cell as a well-mixed chemical reactor in which spatial concentration gradients can be ignored. Often, however, this is a poor assumption and one must come to grips with spatially-extended (nonlinear and often stochastic) dynamical processes to understand cell response. In this talk, we will focus on the directed motility (aka chemotaxis) of eukaryotic cells, where the cellular decision regarding which way to go must of necessity involve creating a non-trivial internal pattern of downstream effectors and hence must involve intracellular spatial degrees of freedom. We will compare several models of this type to recent experiments using *Dictyostelium* as a model organism.