

Kimmel, A.R. and R.A. Firtel (2004). Breaking symmetries: regulation of Dictyostelium development through chemoattractant and morphogen signal-response. *Curr. Opin. Genet. Devel.* 14:540-549.

Dictyostelium discoideum grow unicellularly, but develop as multicellular organisms. At two stages of development, their underlying symmetrical pattern of cellular organization becomes disrupted. During the formation of the multicellular aggregate, individual non-polarized cells re-organize their cytoskeletal structures to sequester specific intracellular signaling elements for activation by and directed movement within chemoattractant gradients. Subsequently, response to secreted morphogens directs undifferentiated populations to adopt different cell fates. Using a combination of cellular, biochemical and molecular approaches, workers have now begun to understand the mechanisms that permit Dictyostelium (and other chemotactic cells) to move directionally in shallow chemoattractant gradients and the transcriptional regulatory pathways that polarize cell-fate choice and initiate pattern formation.