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Excitable Pattern Formation in Inhomogeneous Systems[1] KAUMUDI PRABHAKARA, Cornell University, Max-Planck Institute for Dynamics and Self-Organisation, AZAM GHOLAMI, VLADIMIR ZYKOV, Max-Planck Institute for Dynamics and Self-Organisation, EBERHARD BODENSCHATZ, Cornell University, Max-Planck Institute for Dynamics and Self-Organisation — On starvation, the amoebae *Dictyostelium discoideum* signal via the chemo-attractant cyclic adenosine monophosphate (cAMP). The amoebae sense cAMP through membrane receptors and produce their own cAMP. Simultaneously they produce a basal level of Phosphodiesterase, an enzyme that degrades cAMP. Soon a pattern of rotating spiral waves or circular waves is formed at the multi-cellular level. The causal reasons for the selection of one or the other pattern are still unclear. Here we report experimental and theoretical investigations of the pattern-formation of mixtures of cells starved for different times. The excitability of the amoebae depends on the starvation time due to time dependent gene expressions. Cells starved for longer times are known to exhibit increased excitability. We report phase maps of the patterns for mixtures of different combinations of excitability. Numerical simulations of a modified Kessler-Levine model allow us to explain the experimental results and provide new insights into the dynamical behavior of the system.

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