1058-92-283 **Eirikur Palsson*** (epalsson@sfu.ca), Dept of Biology, Simon Fraser University, 8888 Unviersity DR, Burnaby, BC V5A1S6, Canada. *A cAMP Signaling Model Explains the Benefit of Maintaining Two Forms of Phosphodiesterase in Dictyostelium.*

Dictyostelium cells respond chemotactically to waves of the chemoattractant cAMP that guides cell aggregation towards a signaling center. This process is responsible for the recruitment of many cells resulting in the formation of large aggregation territories. An important component of the signaling system, the enzyme PdsA phosphodiesterase (PDE) that breaks down the external cAMP, can be either membrane-bound or secreted. I use a cell-based model of the cAMP signaling system to show that by utilizing both forms of PDE, *Dictyostelium* can extend the range of cell densities where cAMP waves can propagate, and thus where aggregation can be successful. This could confer an adaptive advantage and suggests why both forms have been maintained through evolution. The model indicates that membrane-bound PDE reduces the likelihood that the aggregation territory breaks up into many smaller territories as the cell density increases, while secreted PDE is important for wave propagation at low cell densities. These findings have implications for other excitable media with similar features of spatially discrete "release" and "degradation" sites. Examples of such systems are Ca^{2+} propagation in cardiac cells and propagation of electrical excitation in nerve axons. (Received February 16, 2010)