

Abstract Submitted  
for the MAR13 Meeting of  
The American Physical Society

**Control Parameter Description of Eukaryotic Chemotaxis**<sup>1</sup> EBERHARD BODENSCHATZ, GABRIEL AMSELEM, ALBERT BAE, MATHIAS THEVES, CARSTEN BETA, MPI Dynamics and Self-Organization — The chemotaxis of eukaryotic cells depends both on the average concentration of the chemoattractant and on the steepness of its gradient. For the social amoeba *Dictyostelium discoideum*, we test quantitatively the prediction by Ueda and Shibata [Biophys. J. 93 11 (2007)] that the efficacy of chemotaxis depends on a single control parameter only, namely, the signal-to-noise ratio (SNR), determined by the stochastic fluctuations of (i) the binding of the chemoattractant molecule to the transmembrane receptor and (ii) the intracellular activation of the effector of the signaling cascade. For SNR 1, the theory captures the experimental findings well, while for larger SNR noise sources further downstream in the signaling pathway need to be taken into account.

<sup>1</sup>Supported by Deutsche Forschungsgemeinschaft SFB 937 and Max Planck Society.

Eberhard Bodenschatz  
MPI Dynamics and Self-Organization

Date submitted: 09 Nov 2012

Electronic form version 1.4