1058-92-244 **Paul A Milewski*** (milewski@math.wisc.edu), 480 Lincoln Dr, Madison, WI 53706, and **Julie Simons** (simons@math.wisc.edu), Madison, WI 53706. *The Volcano Effect in Bacterial Chemotaxis.*

Chemotaxis is the directed motion towards a chemical attractant. Many bacteria chemotax by iteratively swimming in a randomly chosen direction and biasing their swim lengths to lengthen if the environment is improving in the current direction. At a macroscopic level this biased random walk has been modeled by the Keller-Segel (K-S) equations which are conservation laws that have a bacterial flux biased in the direction of increasing attractant concentration. The K-S equations predict that bacteria will aggregate at the maxima of the attractant concentration, and this is not always observed: for rapidly varying concentration gradients, the peak in bacterial concentration is some distance away, lying on a ring. This is the "volcano effect". Our work, starting from a simplified biochemical description of each bacterium and then extracting population level models, shows how to bridge these two regimes (K-S and volcanic). The results are verified against stochastic simulations of virtual bacteria. We also discuss applications to the more complex chemotactic process where the bacteria are themselves producing the chemoattractant. (Received February 16, 2010)