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Translational and Rotational Diffusion of Bacteria Under the Influence of Direct Current[1] JANET PEIFER, Juniata College, YONG WANG, University of Arkansas — Many bacteria, whose mobility is vital for their survival, naturally inhabit aqueous solutions. Therefore, it is of interest to investigate the movement and growth of bacteria in aqueous solutions. In this study, we focus on tracking and quantifying the motion of *E. coli* bacteria in LB medium. We first studied the diffusion of microspheres in water or a 50% glycerol solution, in both of which the diffusion appeared to be Brownian. Then we observed the motion of live *E. coli* bacteria in liquid LB medium, imitating the natural aqueous habitats of many bacterial species. Homemade MATLAB programs extracted the positions and orientations of live bacteria and their trajectories. We quantified the travel distances, translational step sizes, and rotational step sizes of the bacteria. Furthermore, we investigated the effect of electric current on the motion of *E. coli* bacteria. Quantitative analyses showed that the bacteria were more likely to travel longer distances in the absence of electric current while retaining their translational step size and increasing their rotational step size in the presence of electric current. It was also observed that bacteria were drawn to the positive electrode and crowded densely in that area.

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Janet Peifer
Juniata College

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