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A large scale bacterial attraction assay: a new quantitative bacterial migration assay suitable for genetic screens

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Abstract

Bacteria use various motility mechanisms to explore their environments. Chemotaxis is the ability of a motile bacterial cell to direct its movement in response to chemical gradients. A number of methods have been developed and widely used to study chemotactic responses to chemoeffectors including capillary, agar plug, microscopic slide, and microfluidic assays. While valuable, these assays are primarily designed to monitor rapid chemotactic responses to chemoeffectors on a small scale, which poses challenges in collecting large quantities of attracted bacteria. Consequently, these setups are not ideal for experiments like forward genetic screens. To overcome this limitation, we developed the Large Scale Bacterial Attraction assay (LSBA), which relies on the use of a Nalgene™ Reusable Filter Unit and other materials commonly found in laboratories. We validate the LSBA by investigating chemoeffector kinetics in the setup and by using chemoattractants to quantify the chemotactic response of wild-type, and motility impaired strains of the plant pathogenic bacterium *Xanthomonas campestris* pv. *campestris* and the environmental bacterium *Shewanella oneidensis*. We show that the LSBA establishes a long lasting chemoeffector gradient, that the setup can be used to quantify bacterial migration over time and that the LSBA offers the possibility to collect high numbers of attracted bacteria, making it suitable for genetic screens.

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Protocol

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Protocol preparation of bacterial cells

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Protocol LSBA setup

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