Abstract Submitted
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Quantifying the Dynamics of Bacterial Colony Expansion: From Individual Cells to Collective Behavior ERIN SHELTON, MAXIMILIANO GIULIANI, ROBERT MOSCARITOLO, University of Guelph, MATT KINLEY, LORI BURROWS, McMaster University, JOHN DUTCHER, University of Guelph — Type IV pili (T4P) are very thin (5-8 nm in diameter) protein filaments that can be extended and retracted by certain classes of Gram-negative bacteria including *P. aeruginosa* [1]. These bacteria use T4P to move across viscous interfaces, referred to twitching motility. Twitching can occur for isolated cells or in a collective manner [2]. We have developed experimental and data analysis techniques to quantify the expansion of the bacterial colony. Using a custom-built, temperature and humidity controlled environmental chamber, we have studied the transition from individual to collective motion. We have used optical flow analysis to characterize the evolution of the expanding colonies. We have also incorporated fluorescently tagged, non-motile cells, obtained by knocking out proteins essential for twitching motility, into the colonies to observe their transport as cargo by the motile cells. By measuring the flow of the motile cells while also tracking the motion of the non-motile cargo cells, we have obtained a direct measure of the efficiency of the transport of the cargo cells. [1] Burrows, L.L. (2012) Annu. Rev. Microbiol. 66: 493–520. [2] Semmler, A.B. *et al.* (1999) Microbiology 145: 2863-2873.

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