

Abstract Submitted  
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**Theoretical and Experimental Study of Bacterial Colony Growth in 3D** XINXIAN SHAO, ANDREW MUGLER, Department of Physics, Emory University, ILYA NEMENMAN, Department of Physics and Department of Biology, Emory University — Bacterial cells growing in liquid culture have been well studied and modeled. However, in nature, bacteria often grow as biofilms or colonies in physically structured habitats. A comprehensive model for population growth in such conditions has not yet been developed. Based on the well-established theory for bacterial growth in liquid culture, we develop a model for colony growth in 3D in which a homogeneous colony of cells locally consume a diffusing nutrient. We predict that colony growth is initially exponential, as in liquid culture, but quickly slows to sub-exponential after nutrient is locally depleted. This prediction is consistent with our experiments performed with *E. coli* in soft agar. Our model provides a baseline to which studies of complex growth process, such as such as spatially and phenotypically heterogeneous colonies, must be compared.

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