Abstract Submitted
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Growth mediated feedback and the abrupt onset of antibiotic resistance[1] J. BARRETT DERIS, Center for Theoretical Biological Physics, UCSD
— Recent results in our lab indicate that global gene expression will change in a growth-dependent manner for bacteria in sublethal antibiotic levels. We analyzed a system containing a constitutively expressed drug resistance gene and found that growth-mediated feedback provided a mechanism for bistable growth rates. That is, two identical cell-lines in the same antibiotic-infused media may respond with distinct growth rates. Our experimental work with cells carrying this resistance gene has shown that a rapid drop in growth occurs over a relatively small range of antibiotic. This result is consistent with a growth plateau arising in our analysis of the feedback mechanism. Furthermore, experiments have shown that a culture's degree of drug resistance depends on the initial growth conditions prior to exposure to high levels of antibiotics. This result is consistent with the predicted existence of a hysteretic regime near the growth plateau. The work reveals concrete mechanisms by which bacteria cope with high levels of antibiotics and illustrates the importance of considering growth-mediated feedback on gene circuits.

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