Pattern Formation and Rate of Growth in

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ABSTRACT

This research aims to observe and mathematically model the radial and spiral stream formation of EscherichiaColi colonies The mathematical model is based on a recent study of the colony formation of Proteusmirabilis, a

urinary catheters, leading to infection. Understanding the mathematical model for the radial and spiral stream formation of these bacteria will help us to further understandbiofilm formation.

Figure 2. Proteus mirabilis experimental resulXue, C., Budrene, E. O., & Othmer, H. G., 201)1

RESULTS OF PROTEUS MIRABILIS

- ‡ After inoculation, on a hard nutrient rich agar surface, the colony front expands initially as a disc of uniform density.
- **‡** For the first 5-7 hours, swarmer cells (adherent) migrate out of the inoculation site, the slime layer gradually builds up and swarmer's de-differentiate into swimmer cellsbehind the leadingedge
- ‡ We observe that swimmer cells in the colony stream inward, forming complexpatterns.
- ‡ A characteristic feature observed is that the spirals alwayswind CCWwhen viewed from above.

Figure 3. Using a mathematical model to create simulated radial spirals. Kue, C., Budrene, E. O., & Othmer, H. G., 2011)





Acknowledgments

Figure 4. Mathematical model d roteus mirabilis (Xue, C., Budrene, E. O., & Othmer, H. G., 201)1

FUTUREVORK

Currently we are in the processof growing e-coli in vitro on a semi-solid agar. We are working on studying how an additive can affect the radial and spiral streams of growing bio-film. Assuming that cells secrete and respond to a chemoattract6 3 2O 3