

What



Who

Why

Helen Withers

How



Farming, Food and Health. **First**

Te Ahuwhenua, Te Kai me te Whai Ora. Tuatahi

AgResearch



MIRINZ

What

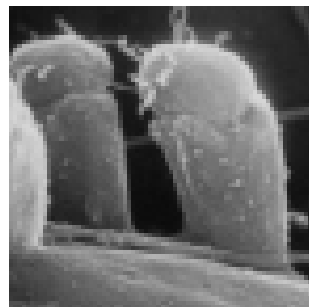
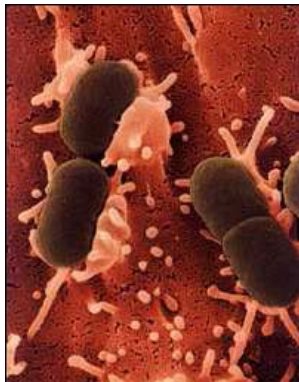
How do food borne pathogens
get into our food?
What are the consequences?



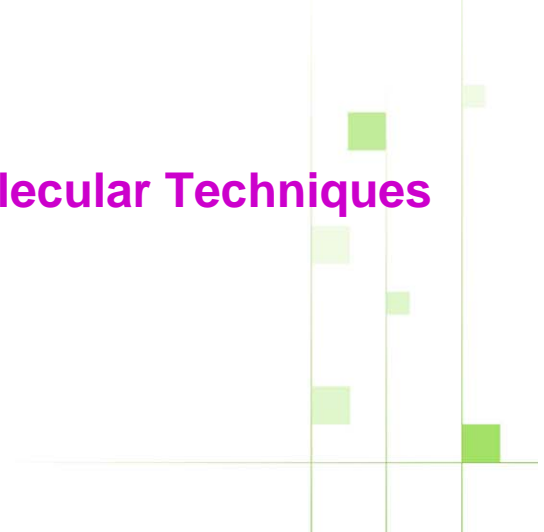
?

Who eg. O157/STEC

Why Food Safety/Intervention.....curiosity



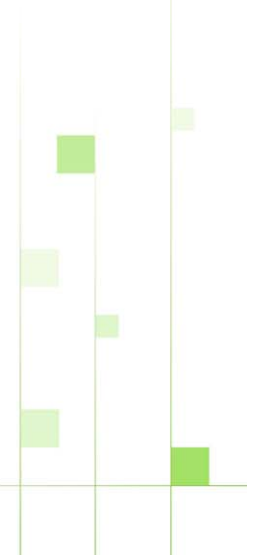
How ? Molecular Techniques



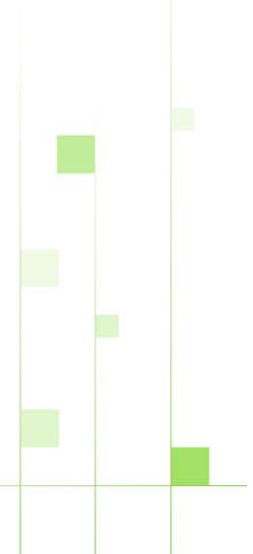
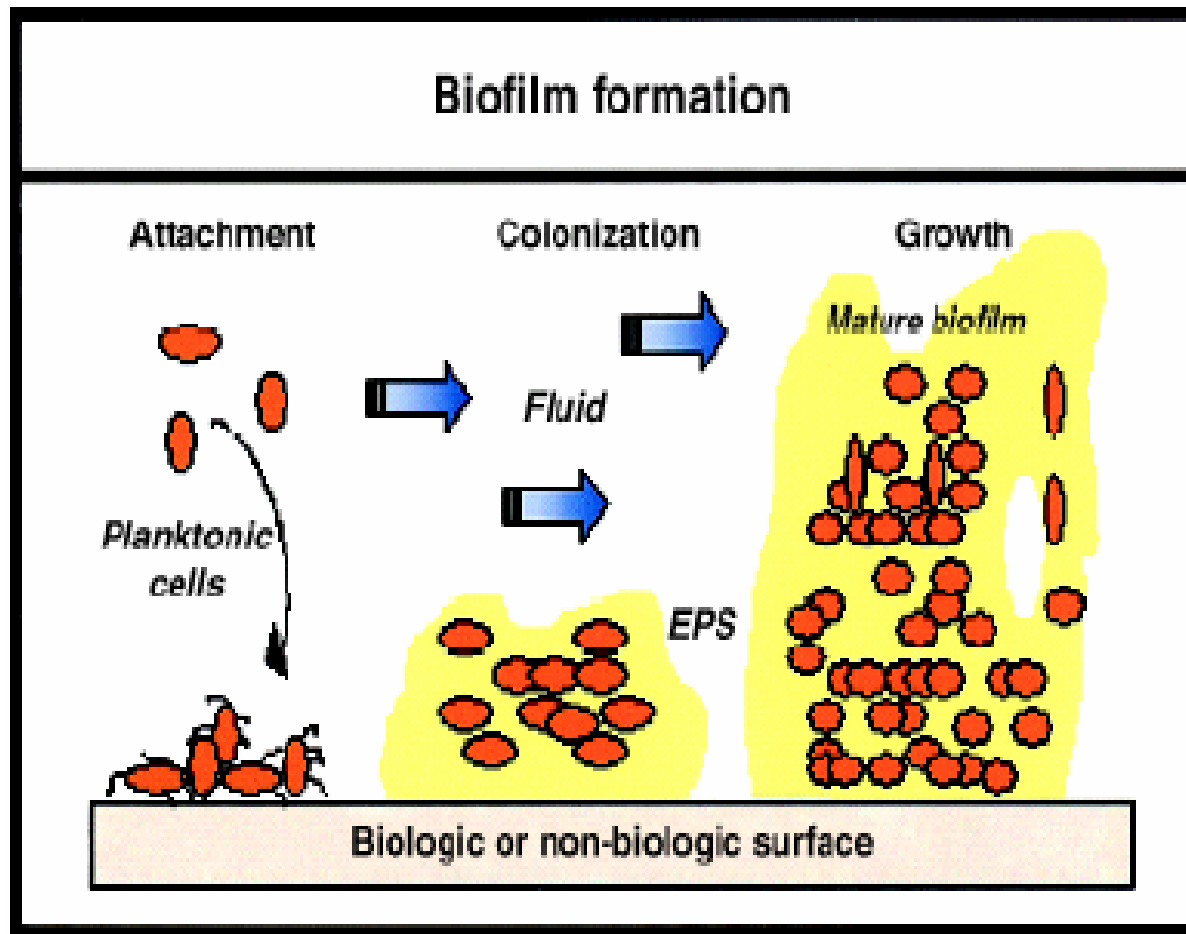
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Biofilms

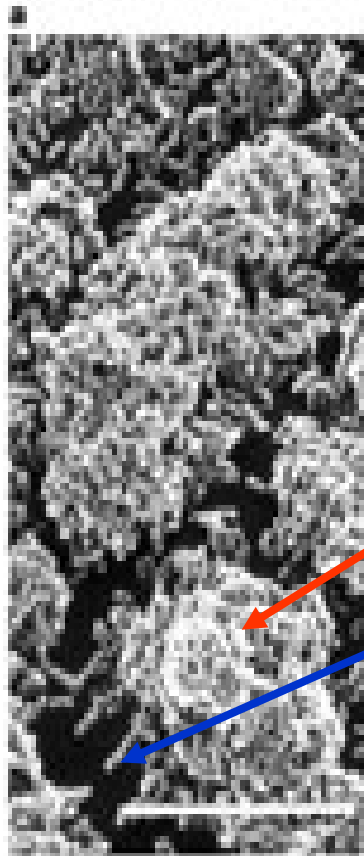
- clusters of bacteria in a matrix
- mixed species



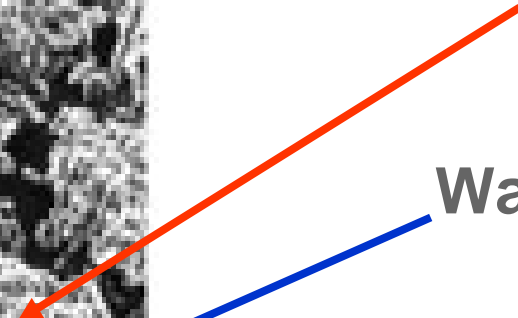
How does a biofilm form?



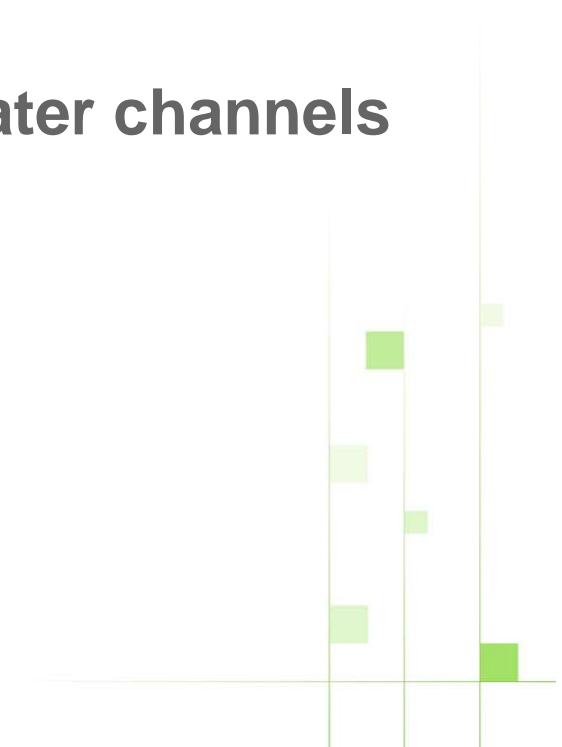
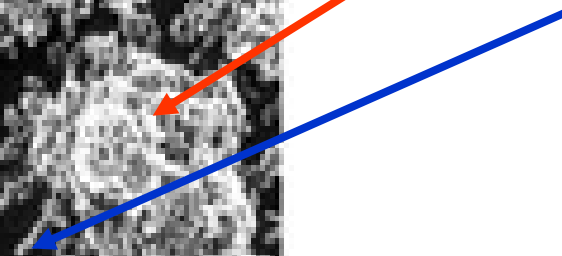
Scanning electron micrograph of a biofilm



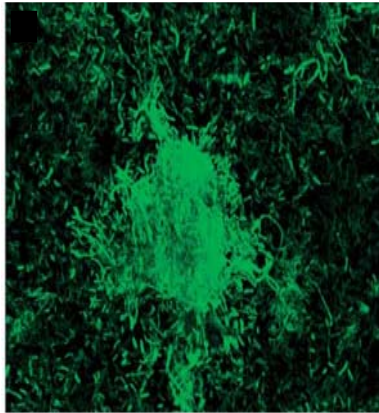
Bacterial clusters



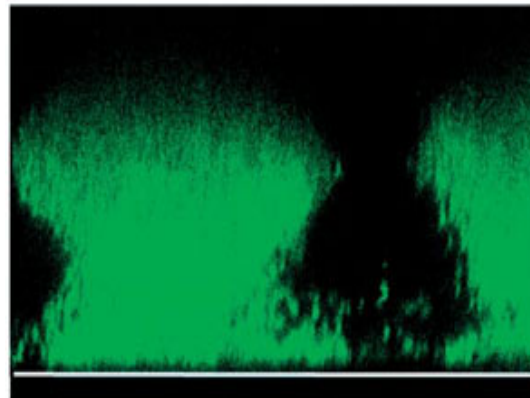
Water channels



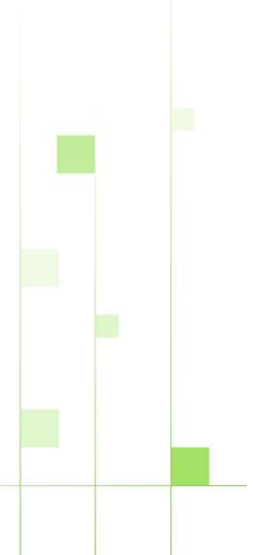
Confocal Laser Scanning Micrograph of a biofilm



Top



Bottom

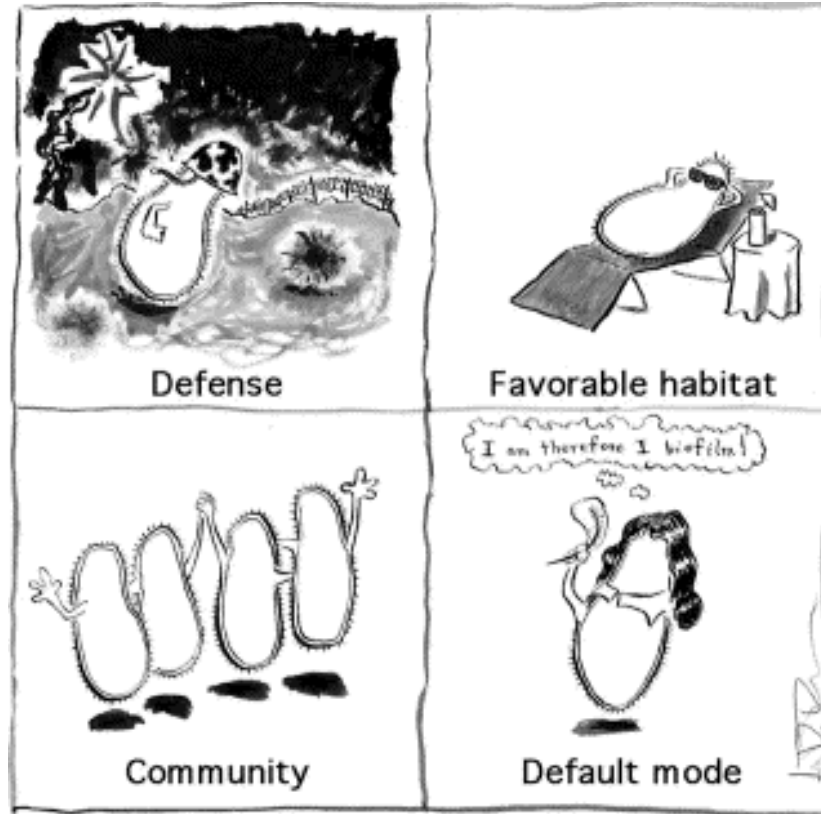


Why live in a biofilm?



- Protection against**
- host defense
 - antibiotics
 - stress
 - physical removal

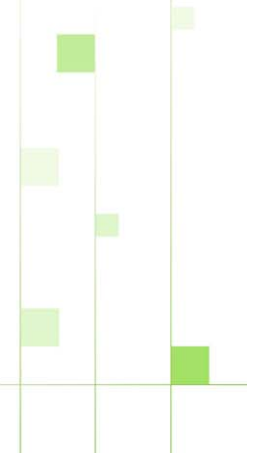
- Multicellular?**
- differentiation
 - co-ordinated behaviour
 - communication
 - metabolic burden
 - gene transfer

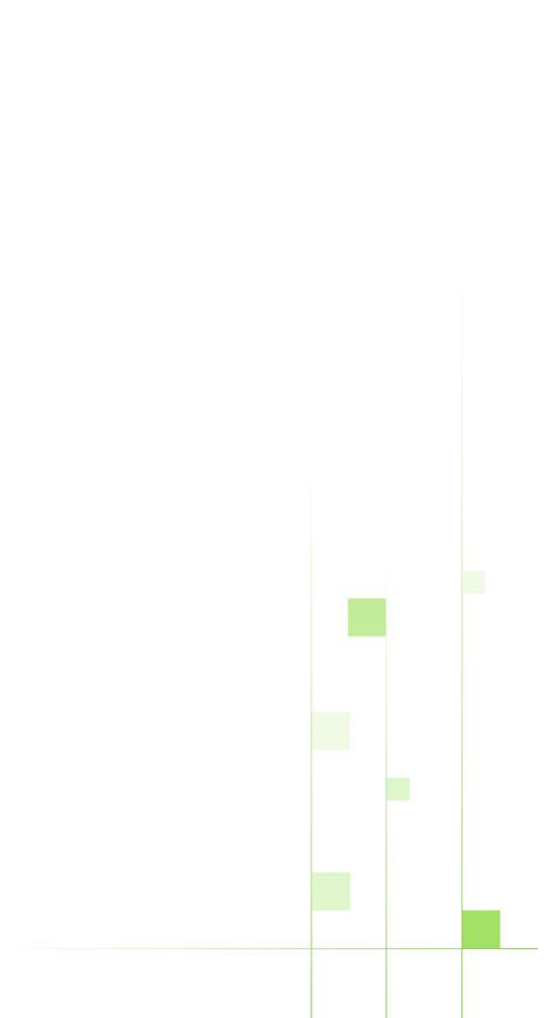
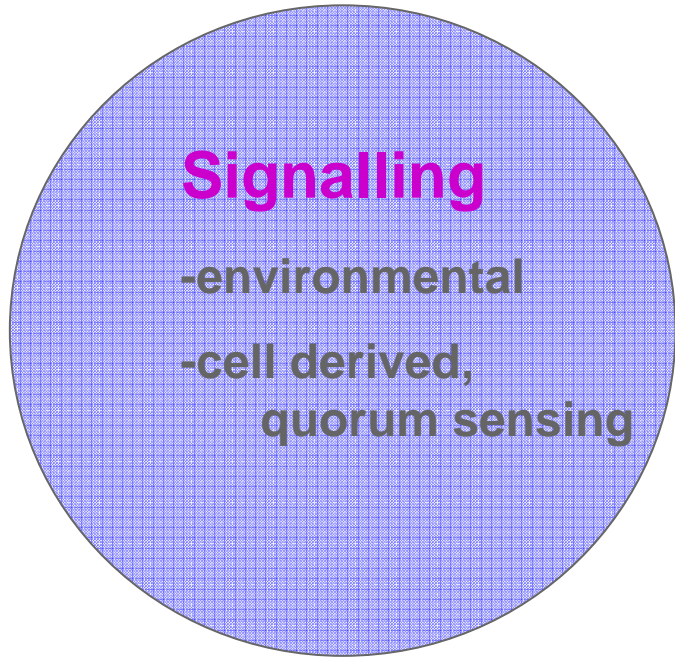


- Mechanism to remain in a desirable niche**
- relatively stable
 - nutrient rich
 - water

- Normal mode of growth**
- Planktonic growth unusual

from Jefferson: FEMS Micro Letters 2004





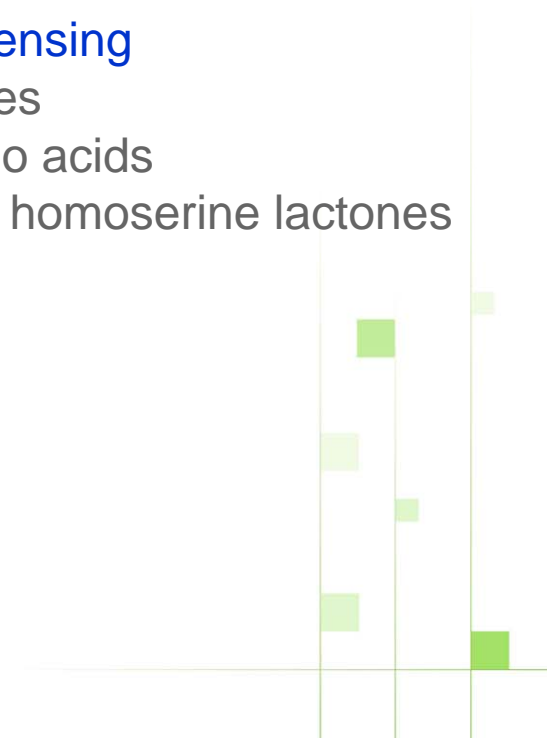


Environmental Signals

- Nutrients
- Water
- Fe
- Acid
- Salt
- pH
- Oxygen
- etc

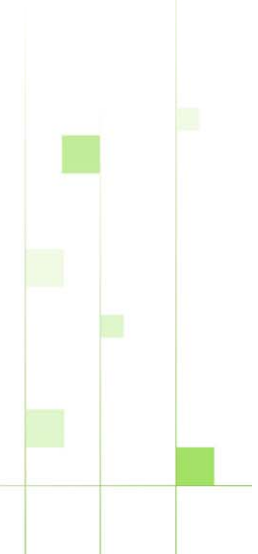
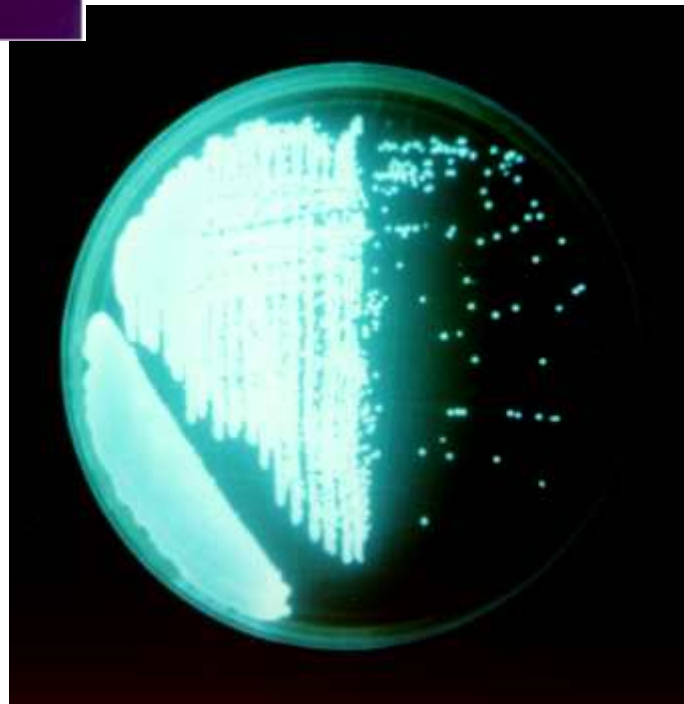
Cell-derived Signals

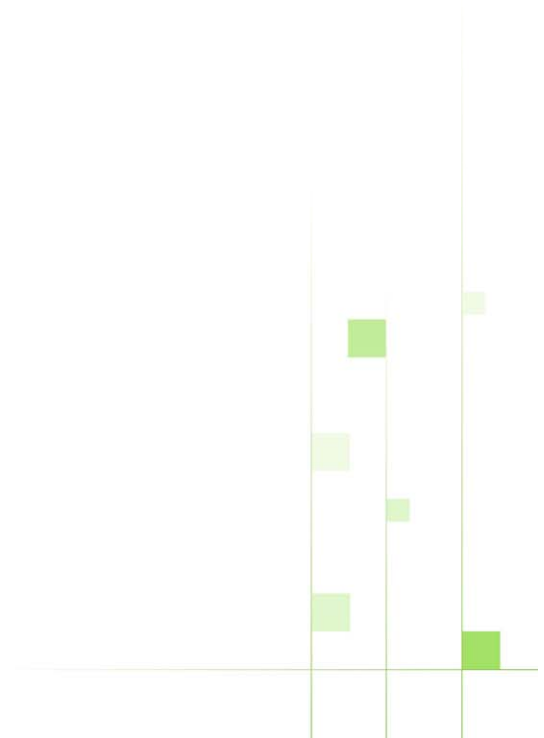
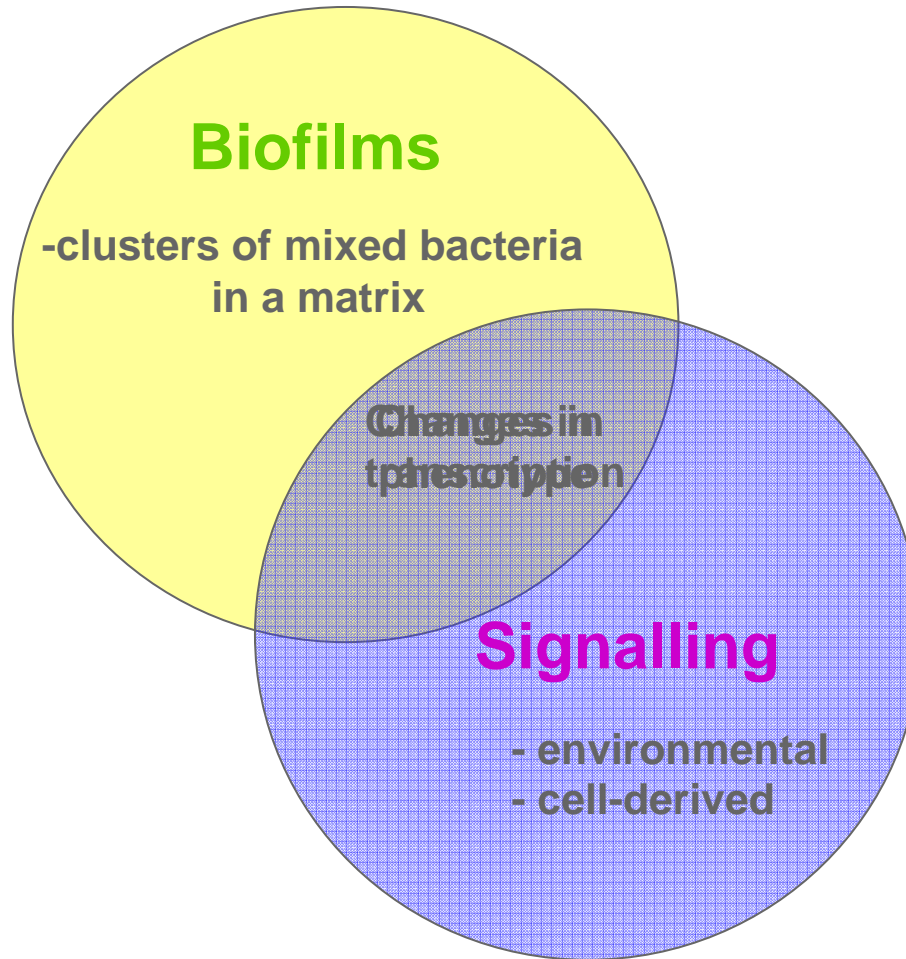
- **Metabolites**
 - Indole
 - AI-2
- **Quorum sensing**
 - peptides
 - diamino acids
 - *N*-acyl homoserine lactones
 - PQS
 - AI-3?



Quorum Sensing

— ability to communicate and coordinate behaviour

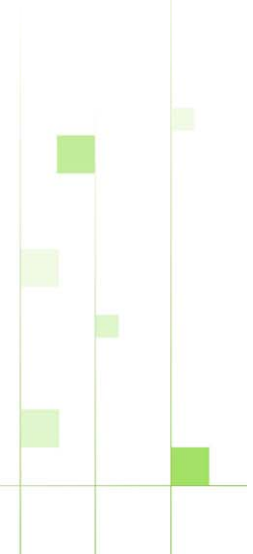


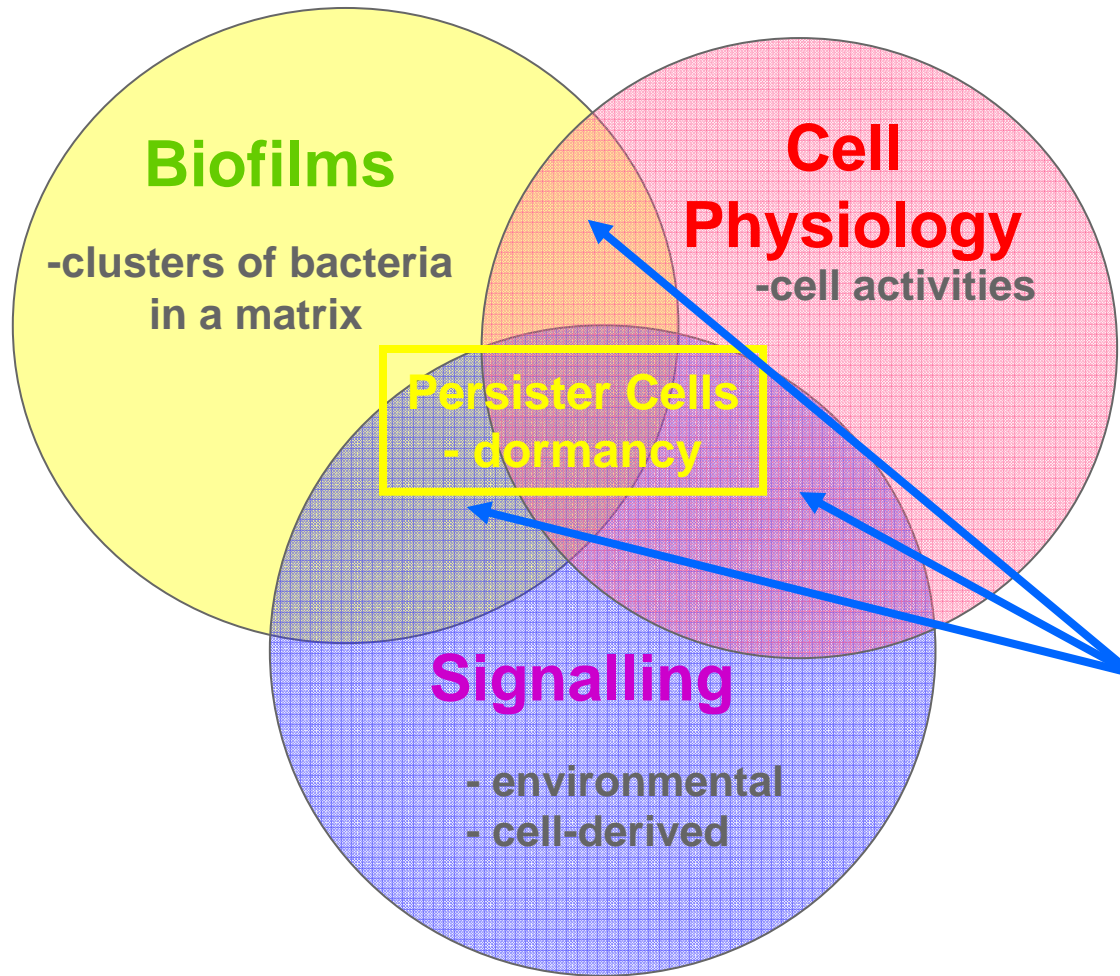




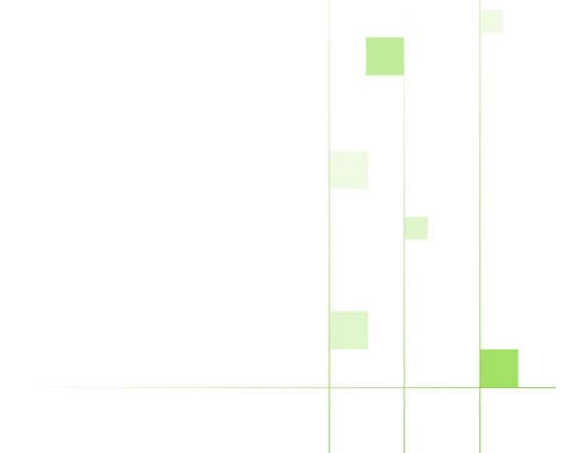
**Cell
Physiology**
- cell activities

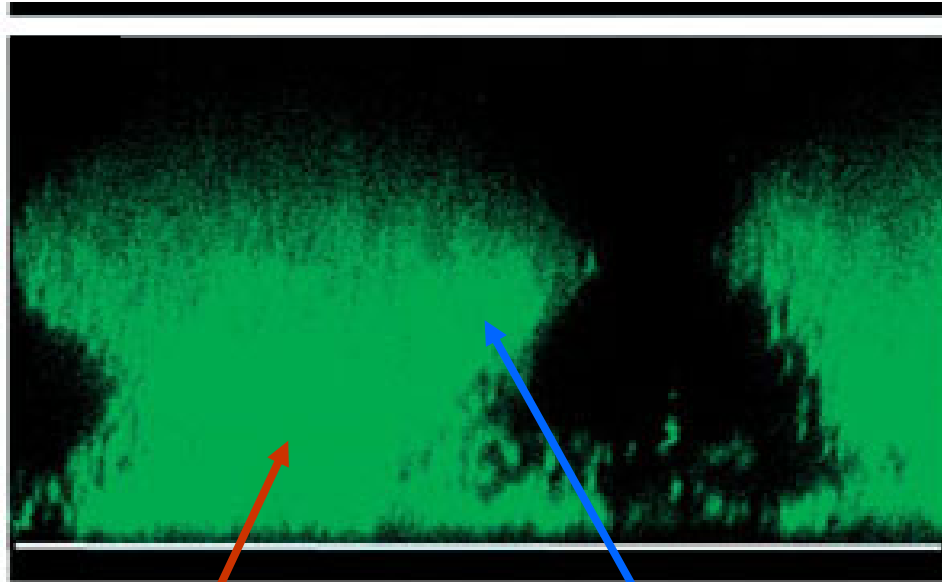
DNA replication
Cell Division
Metabolism
Growth





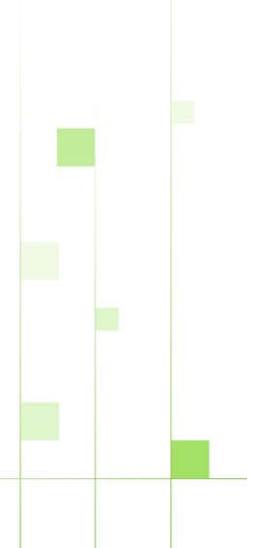
Changes in transcription



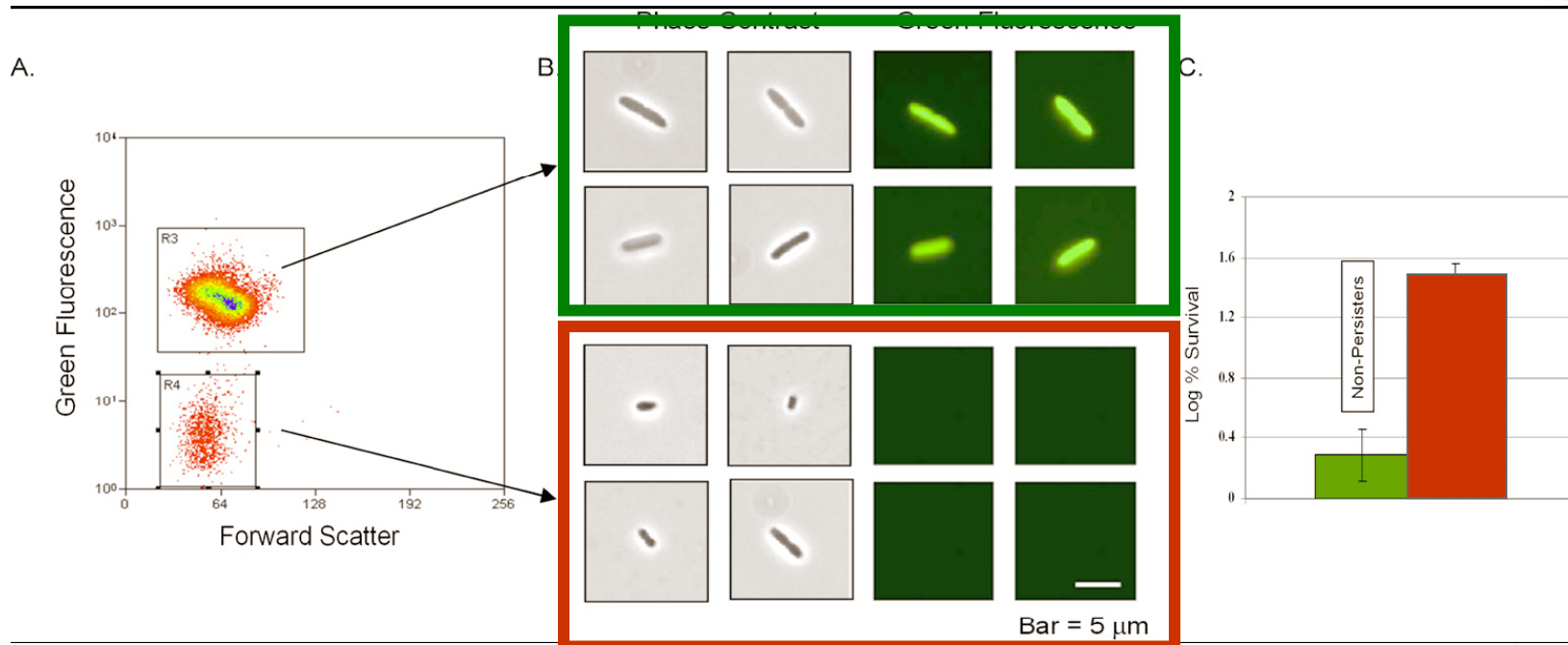


Core Cells
- dormant cells

Exterior Cells
- active cells



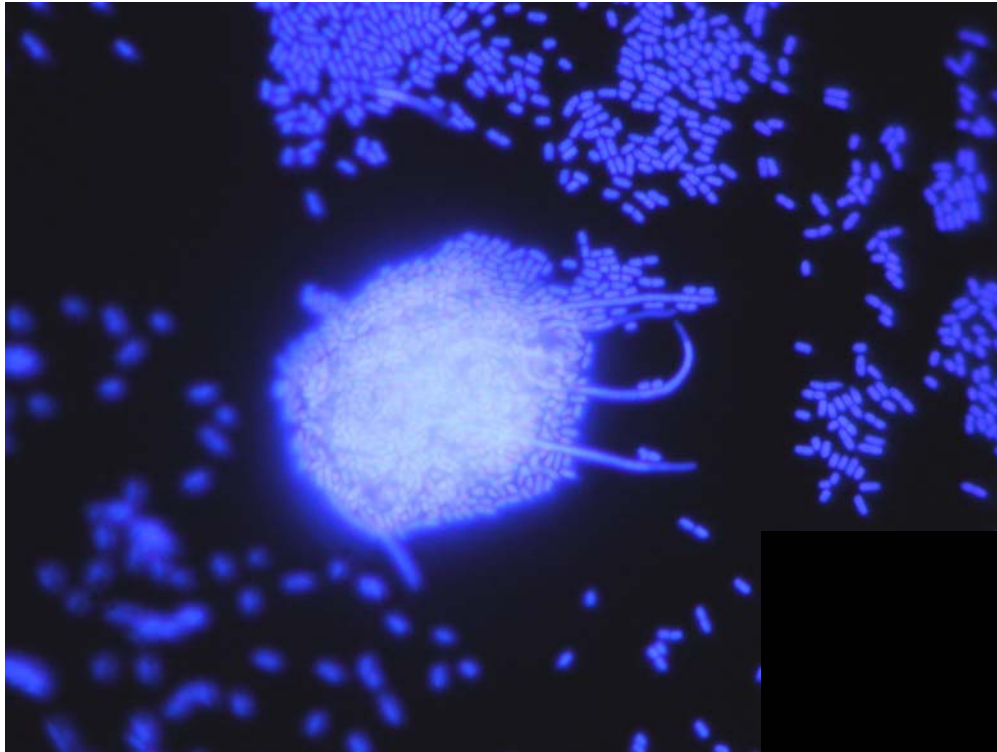
Active Cells



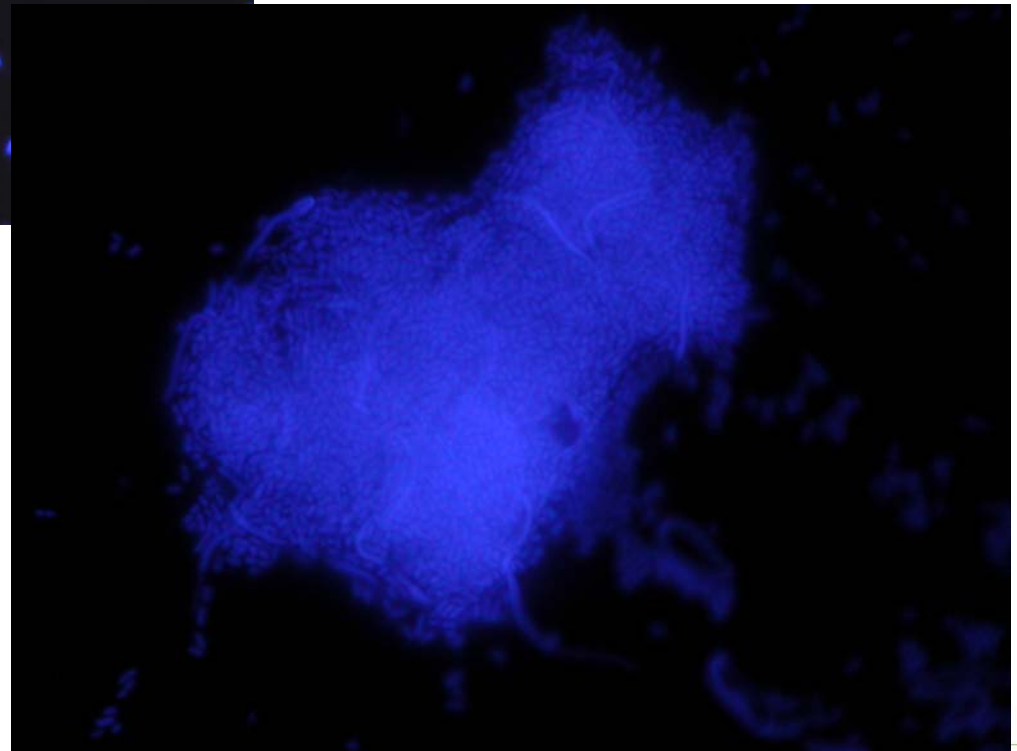
Dormant Cells

Shah et al 2006

Two distinct cell types



Changes in cell morphology





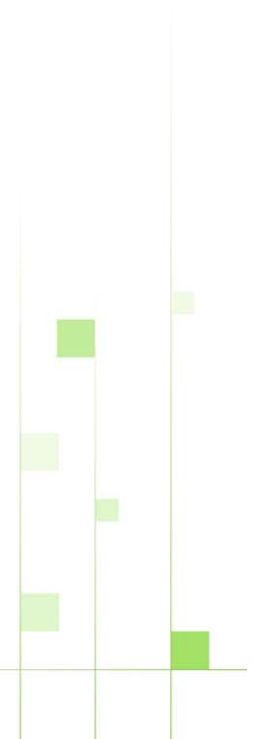
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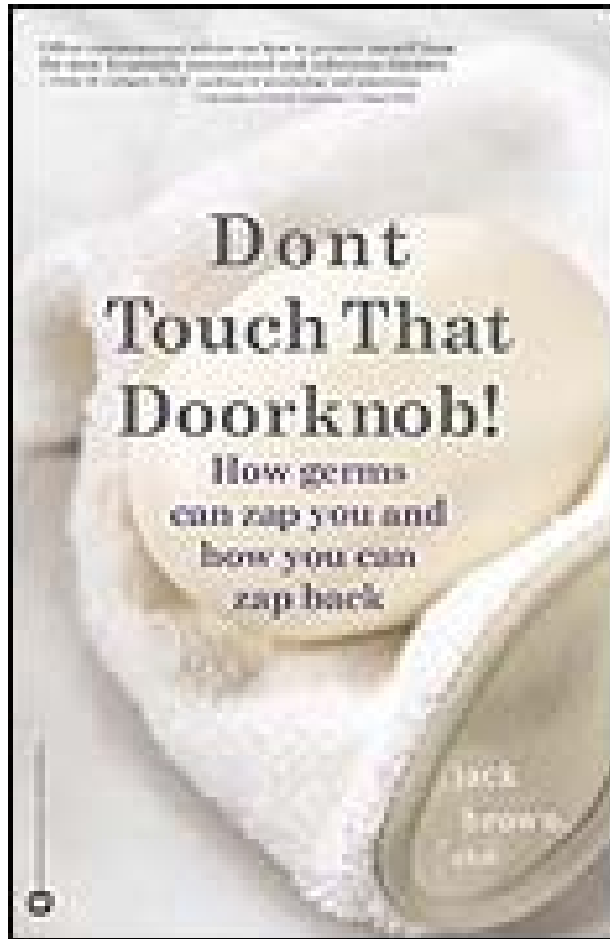
Who

Why

How



A Microbiologist warns...



DON'T TOUCH THAT DOORKNOB!

GERMS ARE EVERYWHERE.

Those seconds on the elevator, those minutes on the checkout line, that evening at the cocktail party. They all bring you up close and personal with your fellow human beings...and with germs. Whatever you call them—bacteria, viruses, fungi, algae, or protozoa—these potent microorganisms are on you, in you, and all around you by the trillions. And while many are vital to our very lives, others are dangerous, even deadly.

NOW, FIND OUT HOW TO FIGHT THESE INVISIBLE FOES

In this comprehensive, down-to-earth manual, a renowned microbiologist and authority on germs shows you how microorganisms affect you in daily life and how you and your immune system can fight back. From the common infections such as a skin rash that you can get in your home to the more dangerous contractible diseases such as hepatitis, this accessible guide tells you:

