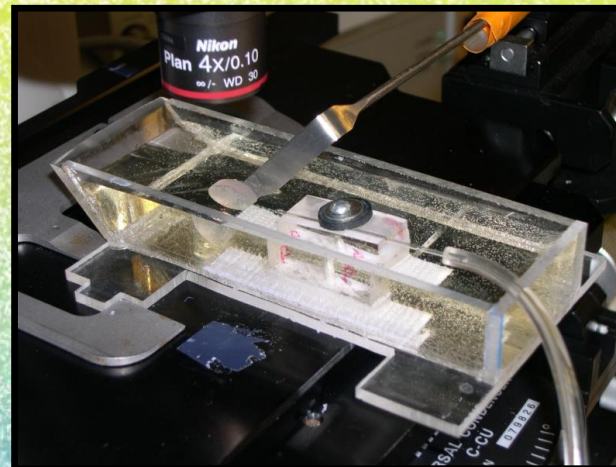
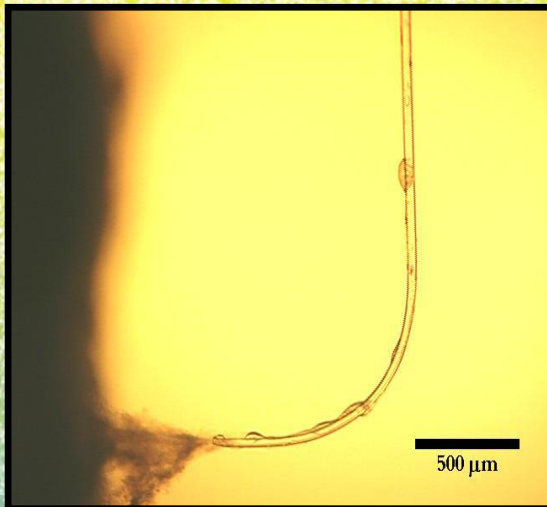




Bacterial Biofilms- A Public Health Nuisance?

SRIJAN AGGARWAL

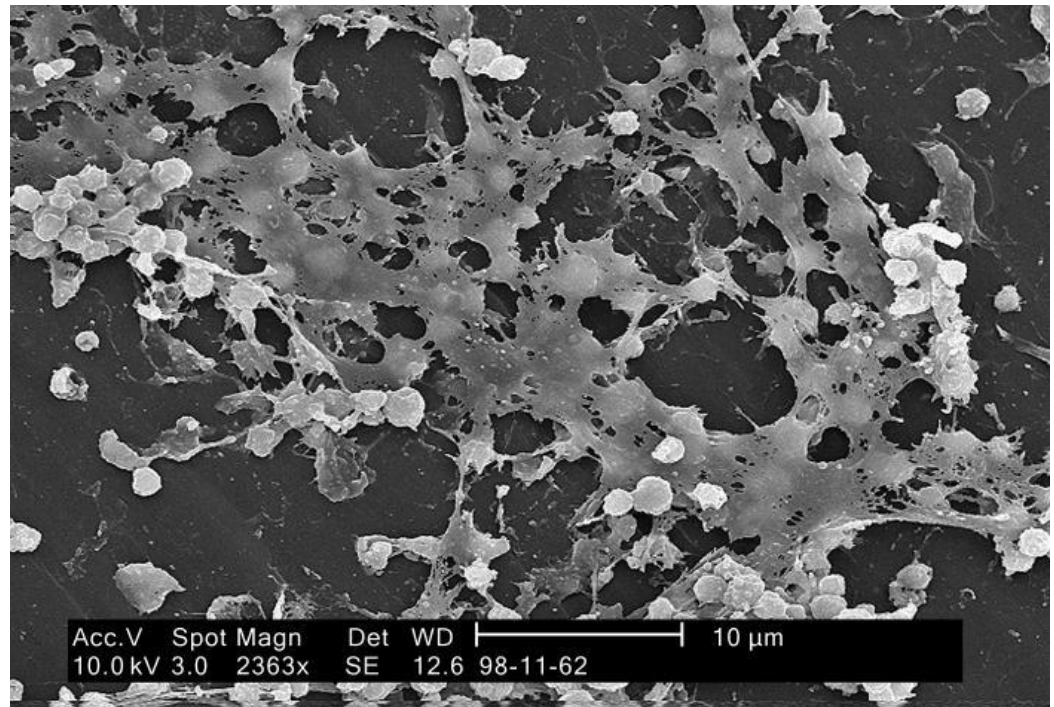
Assistant Professor
Civil & Environmental Engineering
University of Alaska Fairbanks



WHAT IS A BIOFILM?

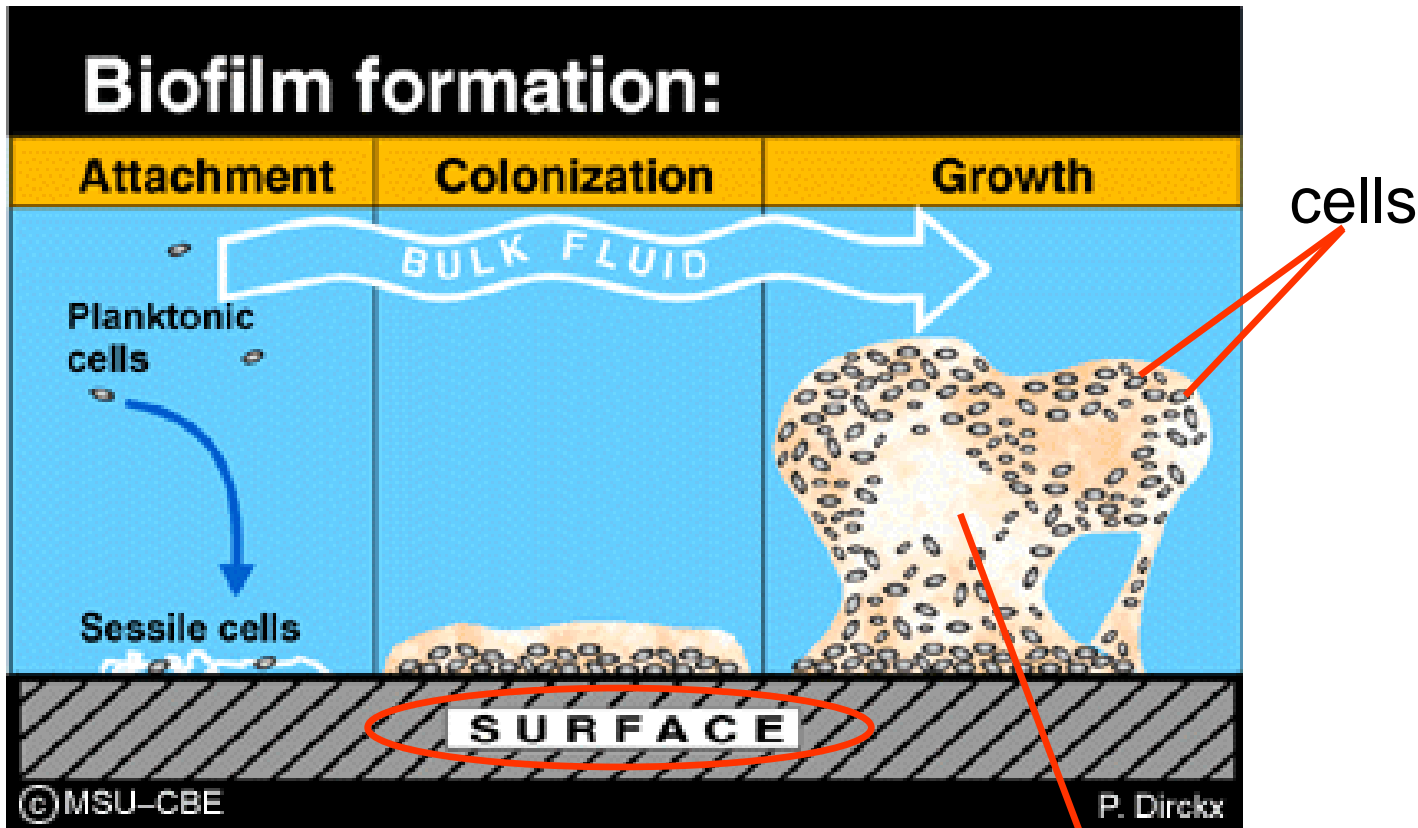
A community of *micro-organisms* attached to a solid surface and encapsulated within self-produced slime.

S. aureus biofilm on the surface of a medical catheter that was removed from a patient (electron micrograph magnified 2363×)



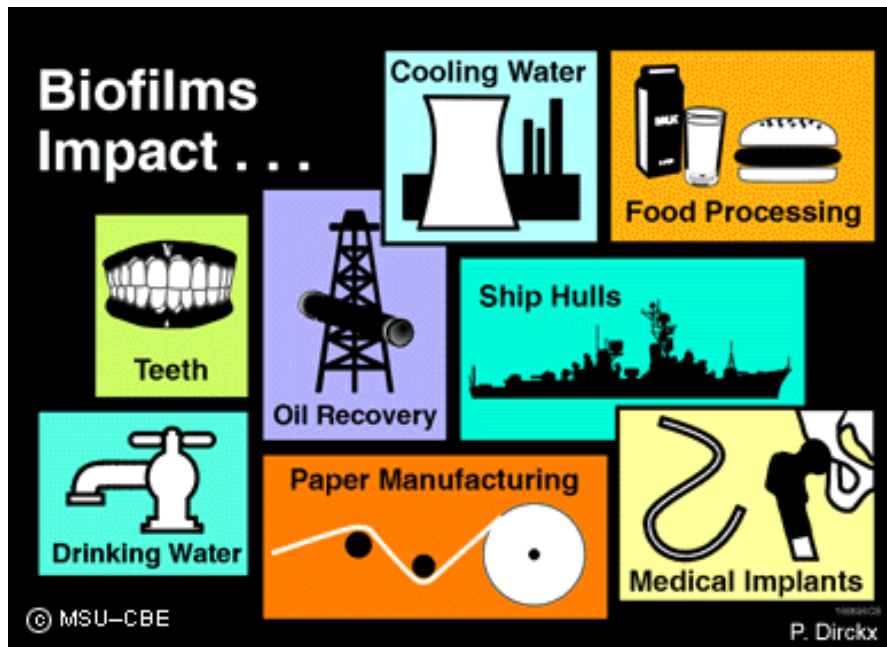
Source: CDC Public Health Image Library

WHAT IS A BIOFILM ?

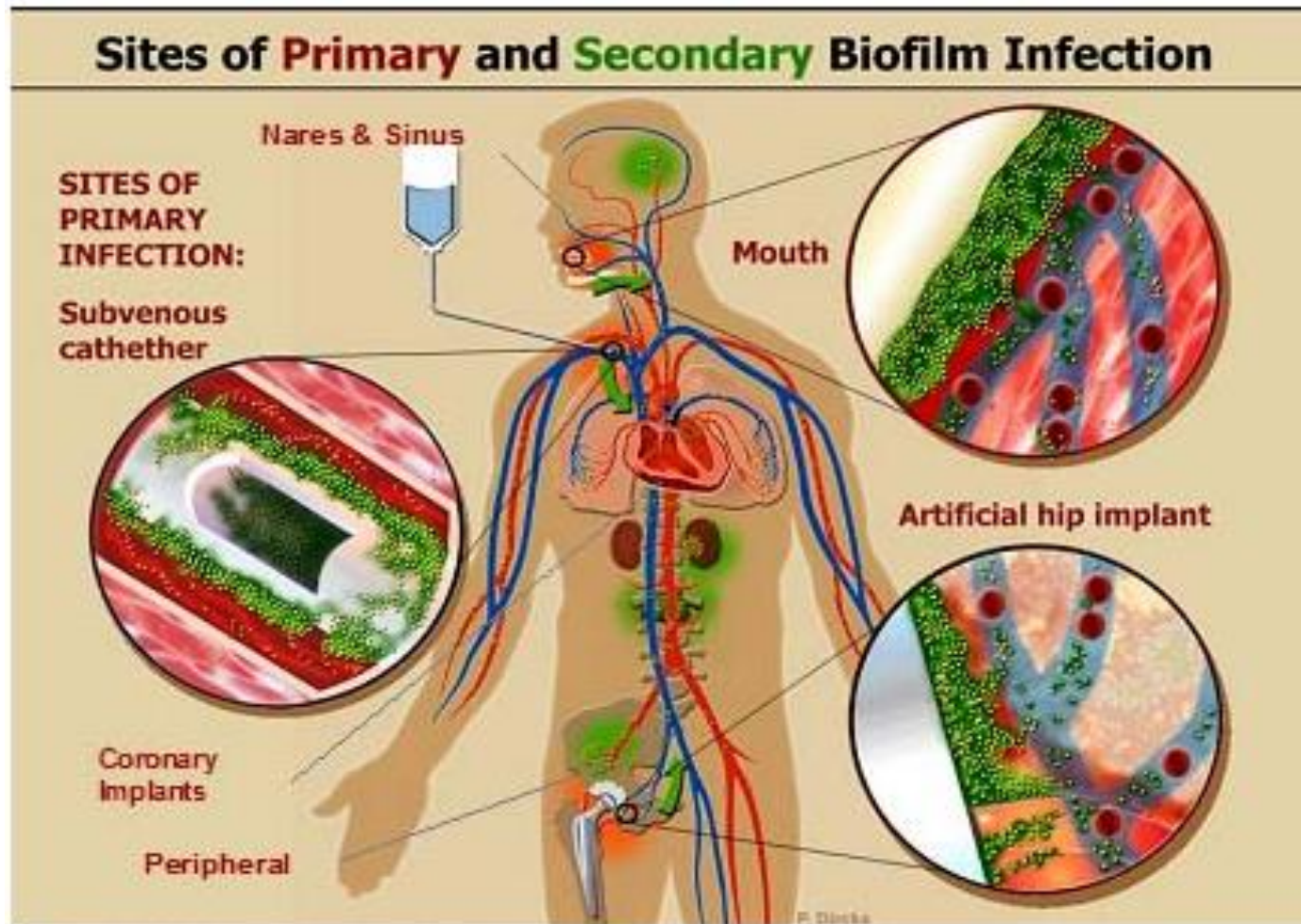


Extracellular polymeric substances
(EPS)

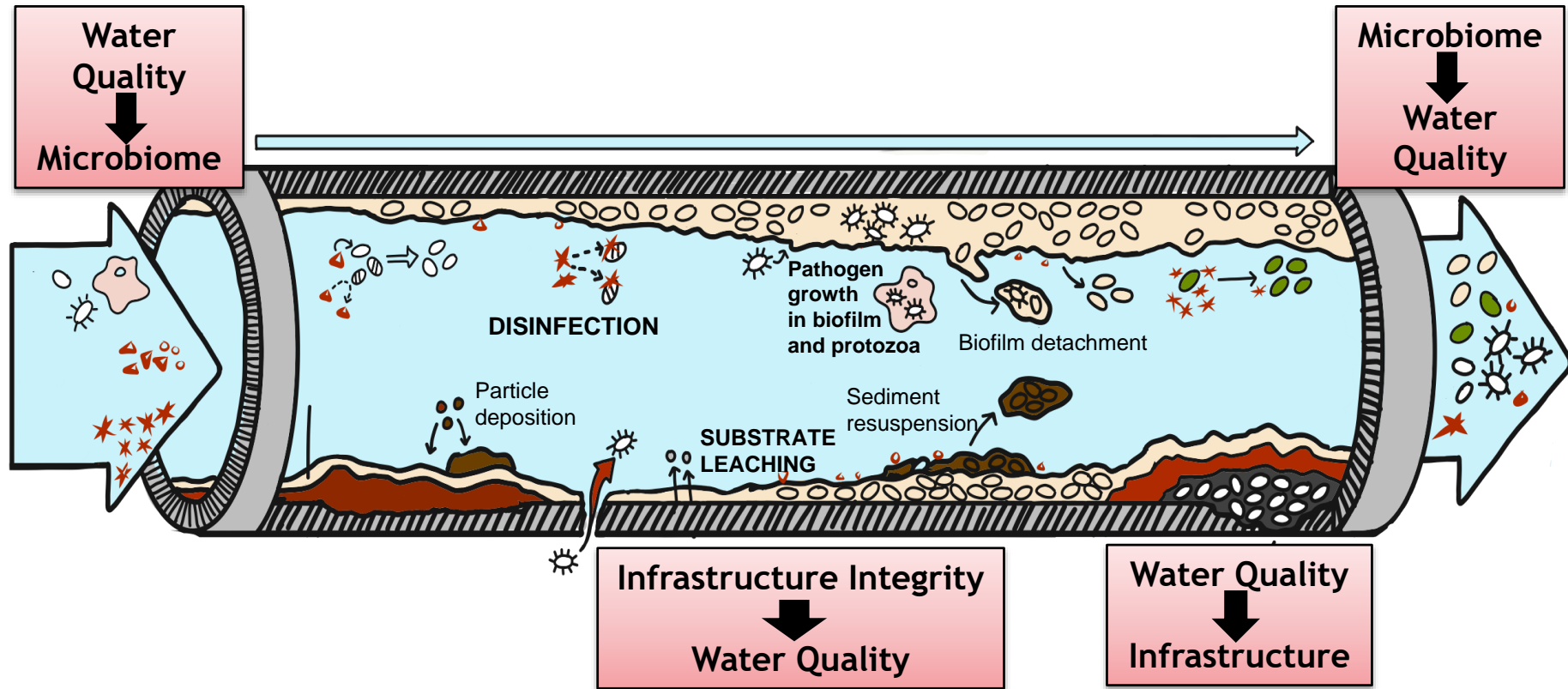
WIDE RANGING BIOFILM IMPACTS



BIOFILMS IN THE HUMAN BODY



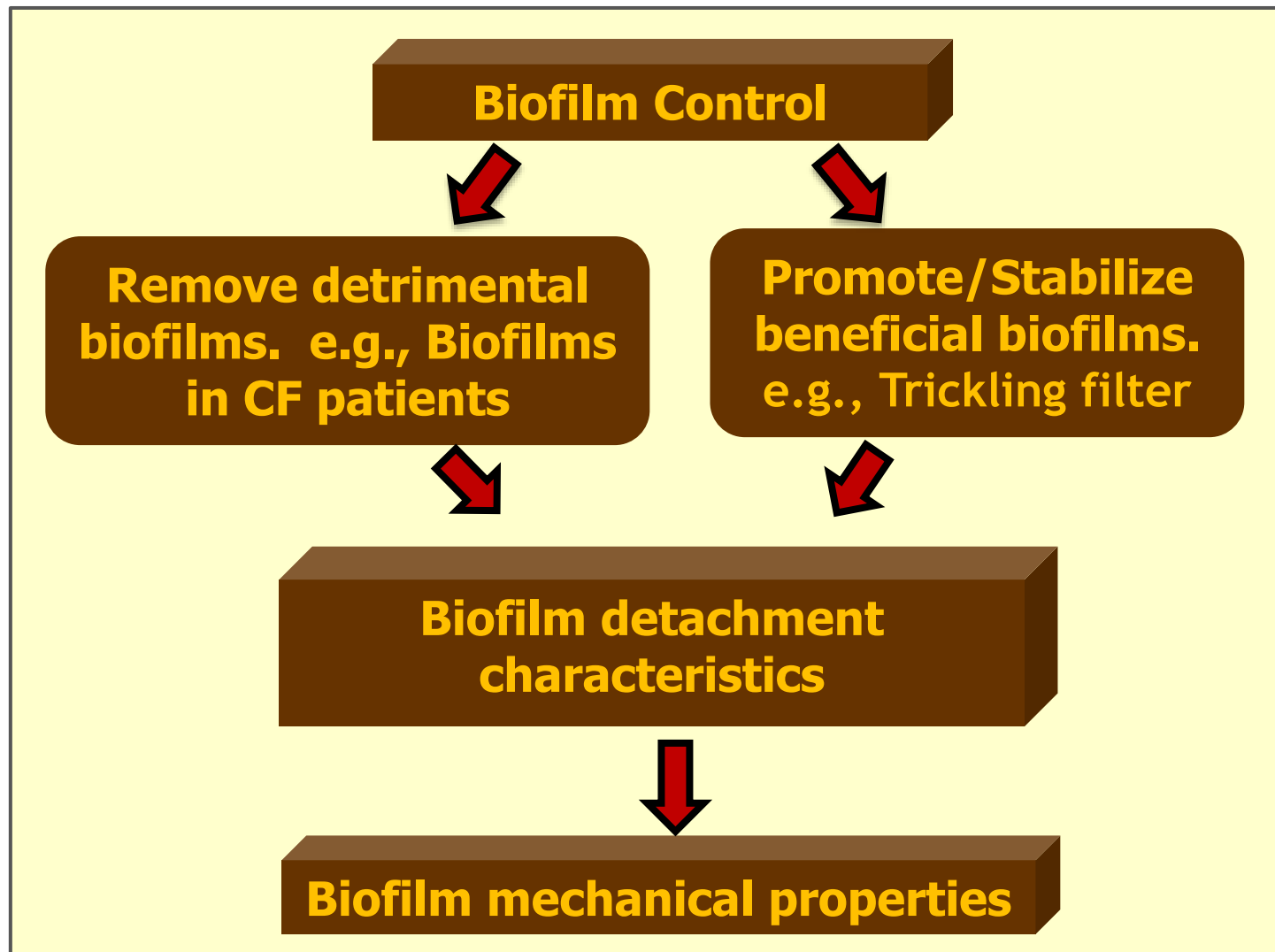
Biofilms In Drinking Water Distribution Systems



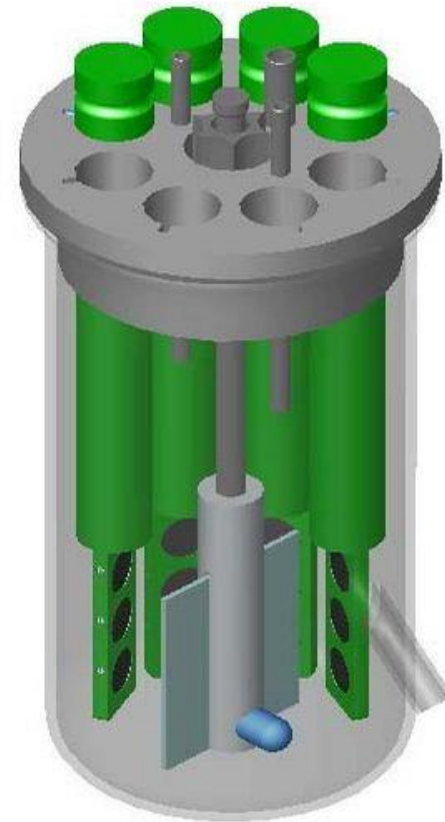
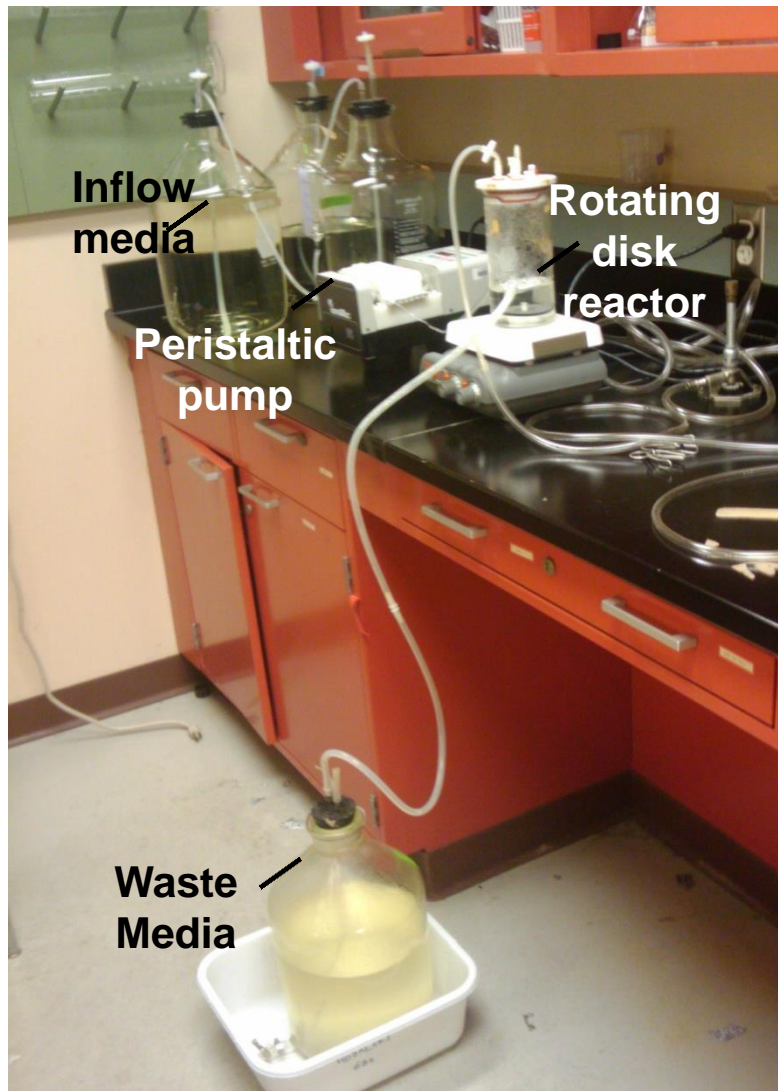
National Science Foundation. 2018-23. CAREER: Fundamental Investigation of Biofilm Mechanical Properties in Drinking Water Distribution Systems. Aggarwal (PI). \$507,986.

Why Biofilm Mechanical Properties ?

Motivation: Biofilm Control

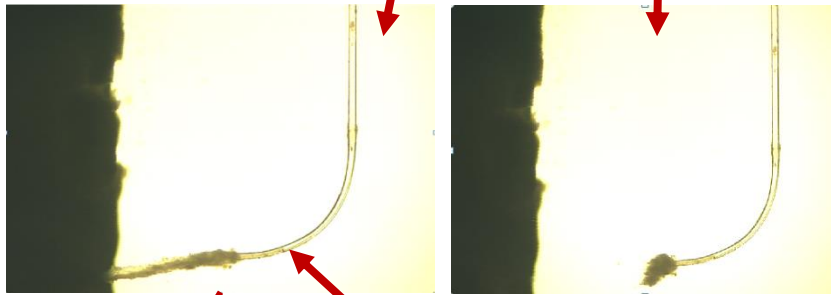
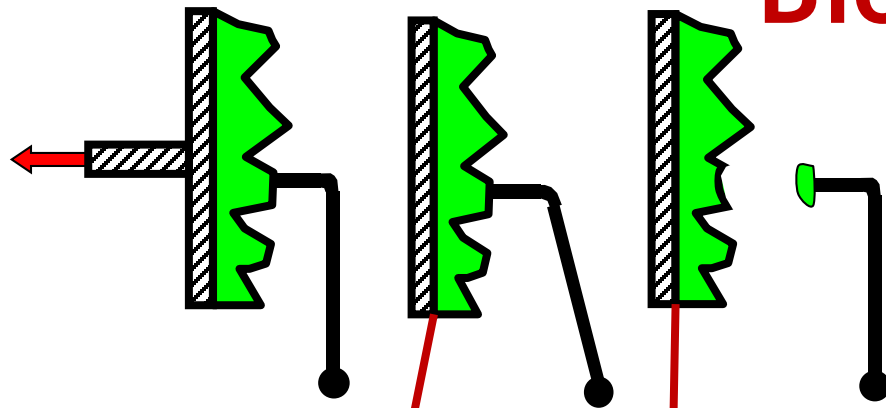


Biofilm Growth Reactors



CDC Biofilm
Reactor

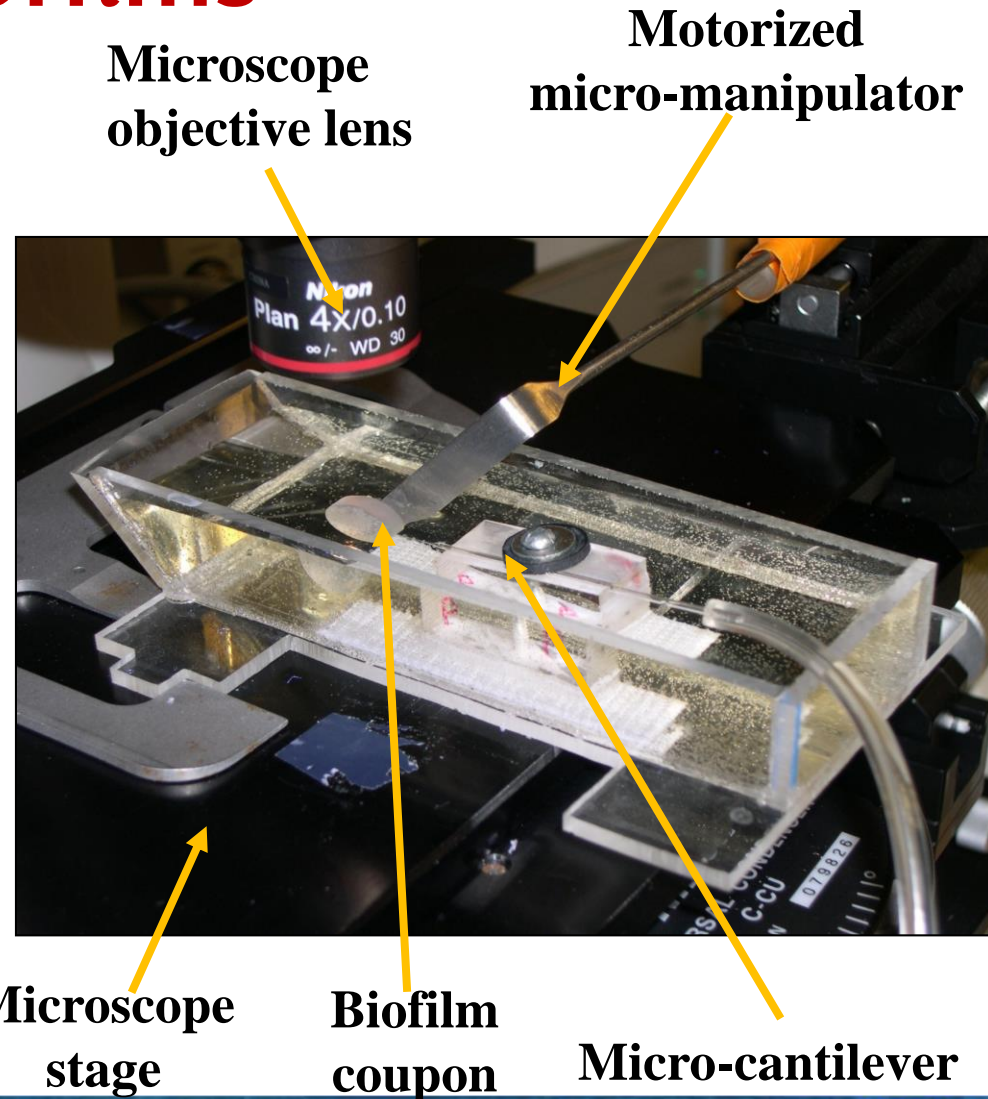
Cohesive/Adhesive Strength of Biofilms



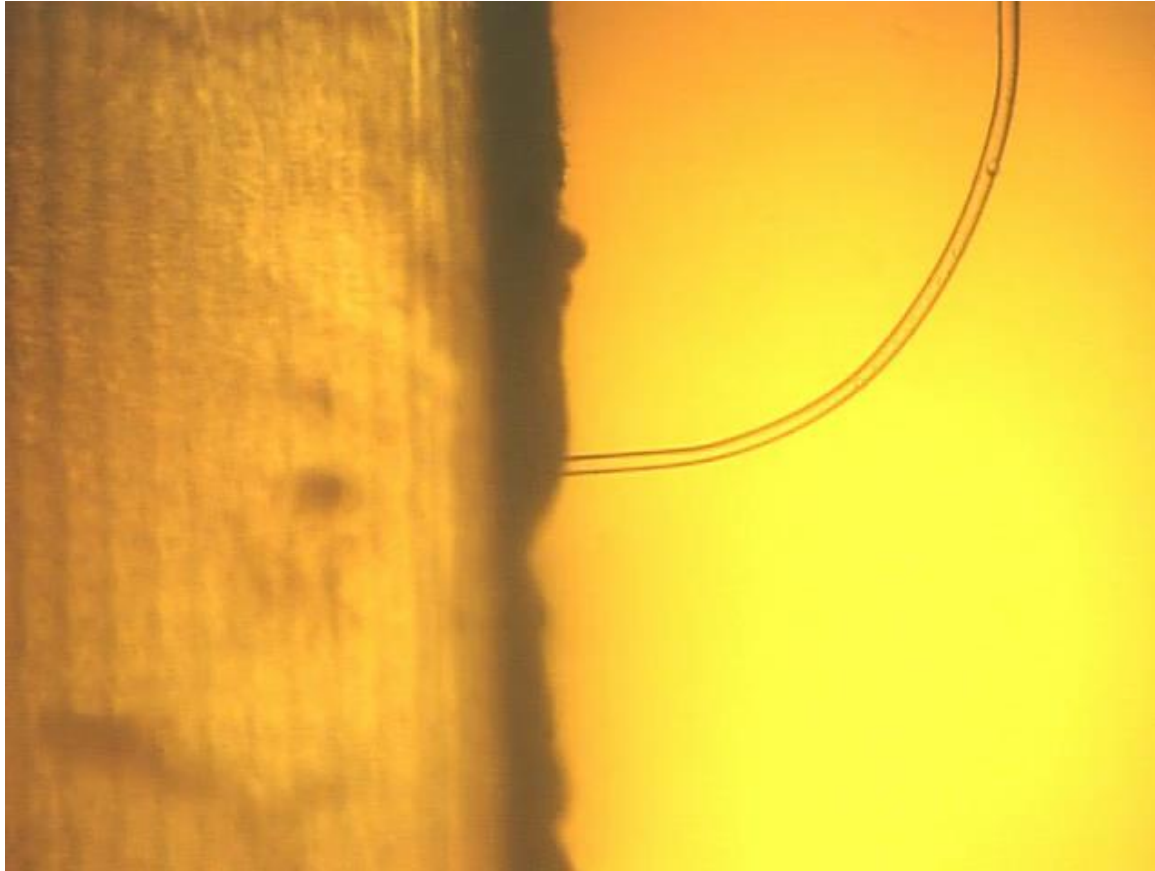
[See the movie](#)

20 μm scale

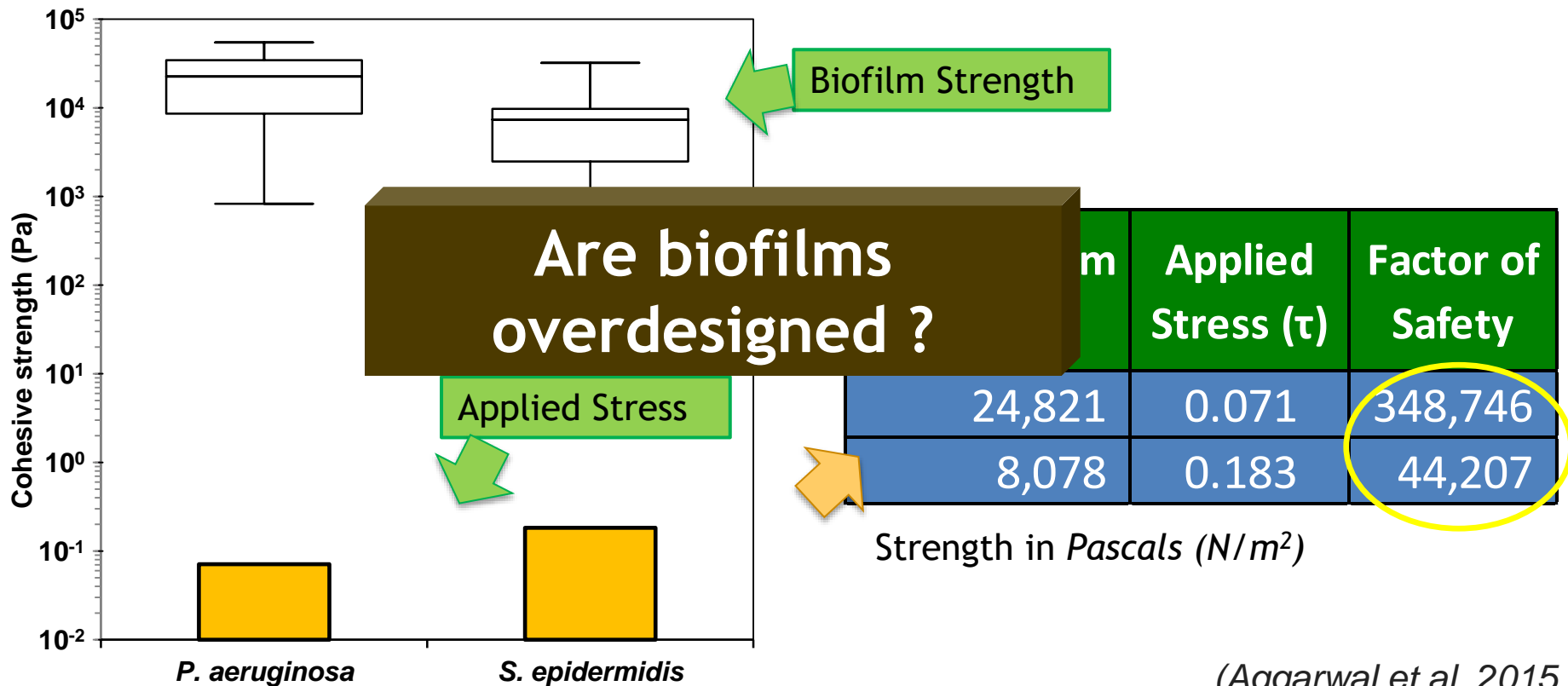
Aggarwal & Hozalski 2012,
Aggarwal & Hozalski 2010
Aggarwal et al. 2010, 2015



Biofilm Mechanical Strength Testing



Why is it difficult to remove biofilms ?

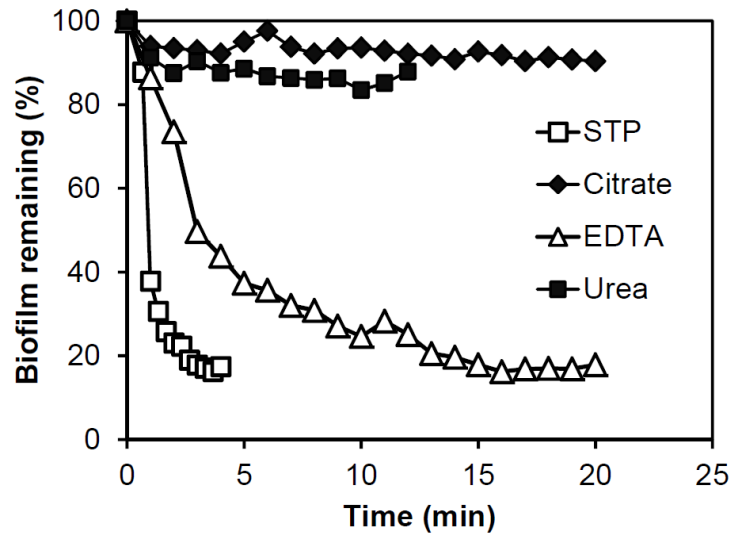
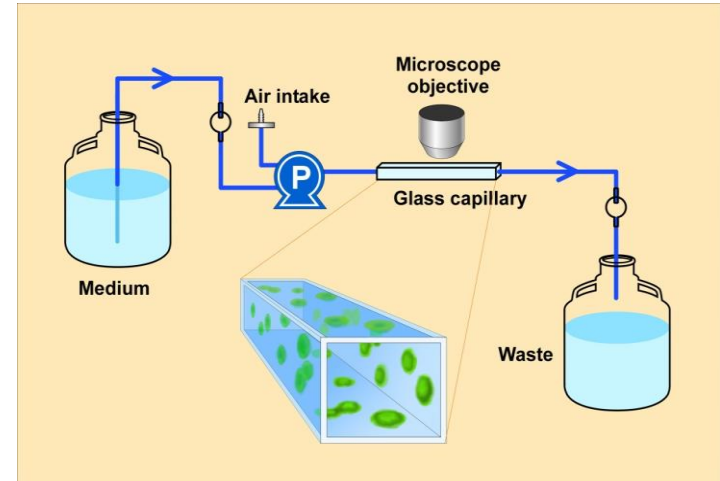


(Aggarwal et al. 2015
Microbiology insights 8, MBI-S31444)

Paradigm shift: Focus on the EPS matrix

- Need to *weaken* the biofilm EPS matrix
- Instead of bacteria, focus on the EPS matrix
- Investigate EPS weakening agents termed as ‘detachment-promoting agents’ (DPAs)
 - e.g. Dispersin B, Tannins, D-amino acids, urea, enzymes

Flow Cell Studies



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QUESTIONS?