


International Association for Food Protection®

Processing Water - I Thought It Was Sanitary

Moderator: Josie Greve-Peterson PSSI Food Safety Solutions, United States

Organized by the Water Safety and Quality PDG

Sponsored by the IAFP FOUNDATION

Please consider making a contribution

This webinar is being recorded and will be available to IAFP members within one week.

International Association for Food Protection® WEBINAR


International Association for Food Protection®

Webinar Housekeeping

- For best viewing of the presentation material, please click on ‘maximize’ in the upper right corner of the ‘Slide’ window, then click ‘Escape’ to return to normal view.

- Questions should be submitted to the presenters during the presentation via the **Questions section** at the right of the screen. Questions will be answered at the end of the presentations.

International Association for Food Protection® WEBINAR


International Association for Food Protection®

Webinar Housekeeping

- It is important to note that all opinions and statements are those of the individual making the presentation and not necessarily the opinion or view of IAFP.

- This webinar is being recorded and will be available for access by IAFP members at www.foodprotection.org within one week.

International Association for Food Protection® WEBINAR

Today's Presenters

Josie Greve-Peterson
PSSI Food Safety Solutions, United States

Josie Greve-Peterson is the Corporate Microbiologist for PSSI Food Safety Solutions where she develops and implements strategies and programs to mitigate food safety risks, which includes providing microbiological and technical support. Josie has a B.S. and M.S. degree in microbiology, more than 11 years of experience in the food industry in various quality management and food testing roles, and serves as Vice-Chair of the Dairy PDG.

Diane Walker
Montana State University, United States

Diane Walker is a Research Engineer at Montana State University's Center for Biofilm Engineering where she works with an interdisciplinary team of engineers, microbiologists and statisticians in the Standardized Biofilm Methods Lab (SBML), developing methods to grow, treat, sample and analyze biofilms for use by academia, industry and the regulatory agencies. Diane has degrees in biology, bio-resources engineering, and environmental engineering from MSU, and has worked with the SBML for more than 15 years.

International Association for Food Protection WEBINAR


International Association for Food Protection®

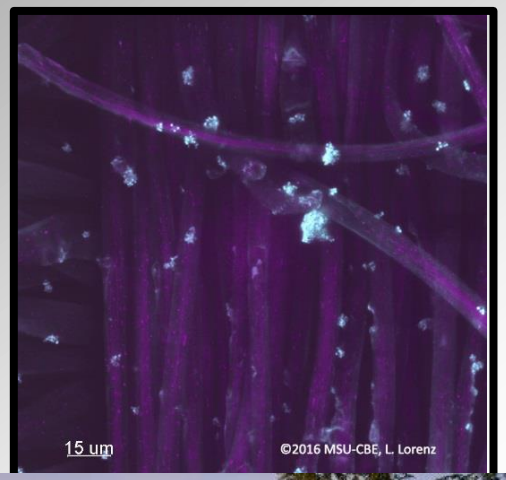
Today's Presenters

Phyllis Posy
Posy Global, Israel

Phyllis Posy has extensive experience working with city, state, federal and international governments, and stakeholders, bringing environmental, water and reuse technologies to market, and implementing them to improve water and food processing. She is President of Posy Global in Jerusalem, Israel, and Secretary of the Water PDG.

Neil Bogart
Ecolab, United States

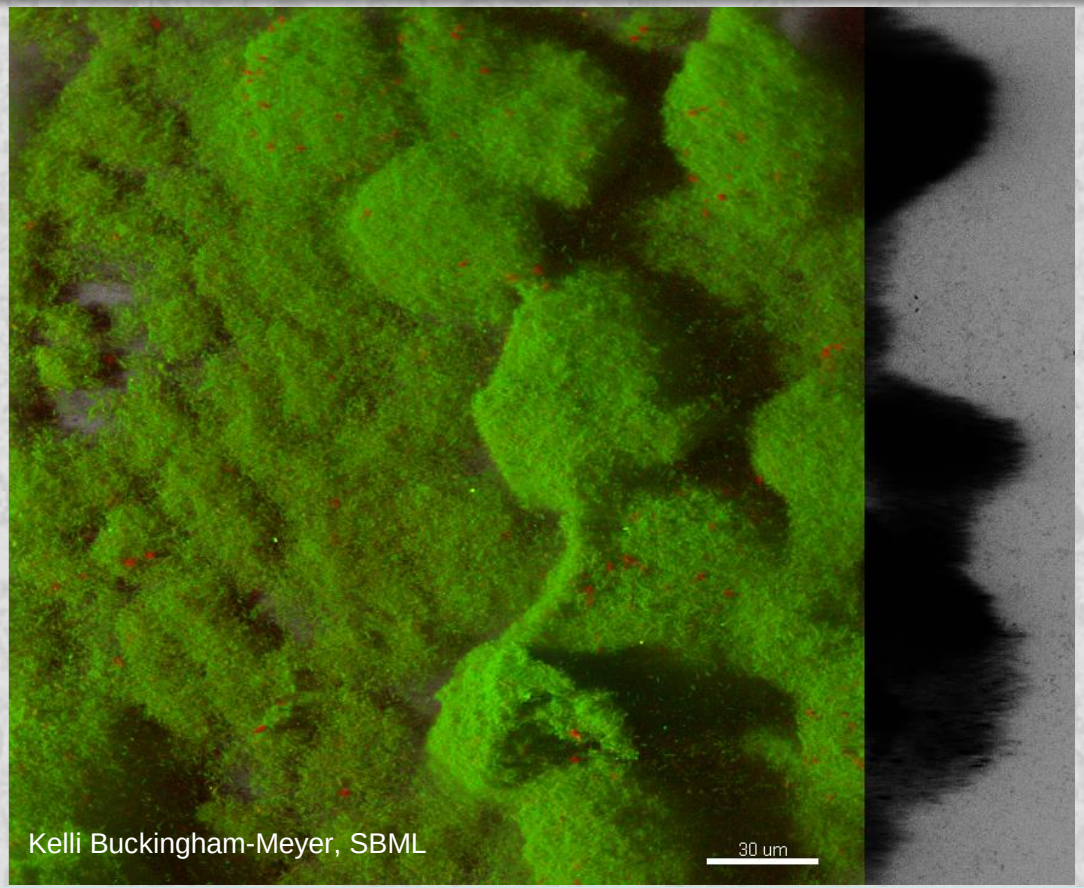
Neil Bogart is an Executive Area Technical Support Coordinator for the Food & Beverage division of Ecolab. Prior to Ecolab, he worked in food manufacturing in Quality and Regulatory and was a Food Safety Consultant specializing in food safety program development and sanitation systems. He is also a Chef. Neil holds a Food Science degree from Mississippi State University and his Le Cordon Bleu from Monroe County Community College.



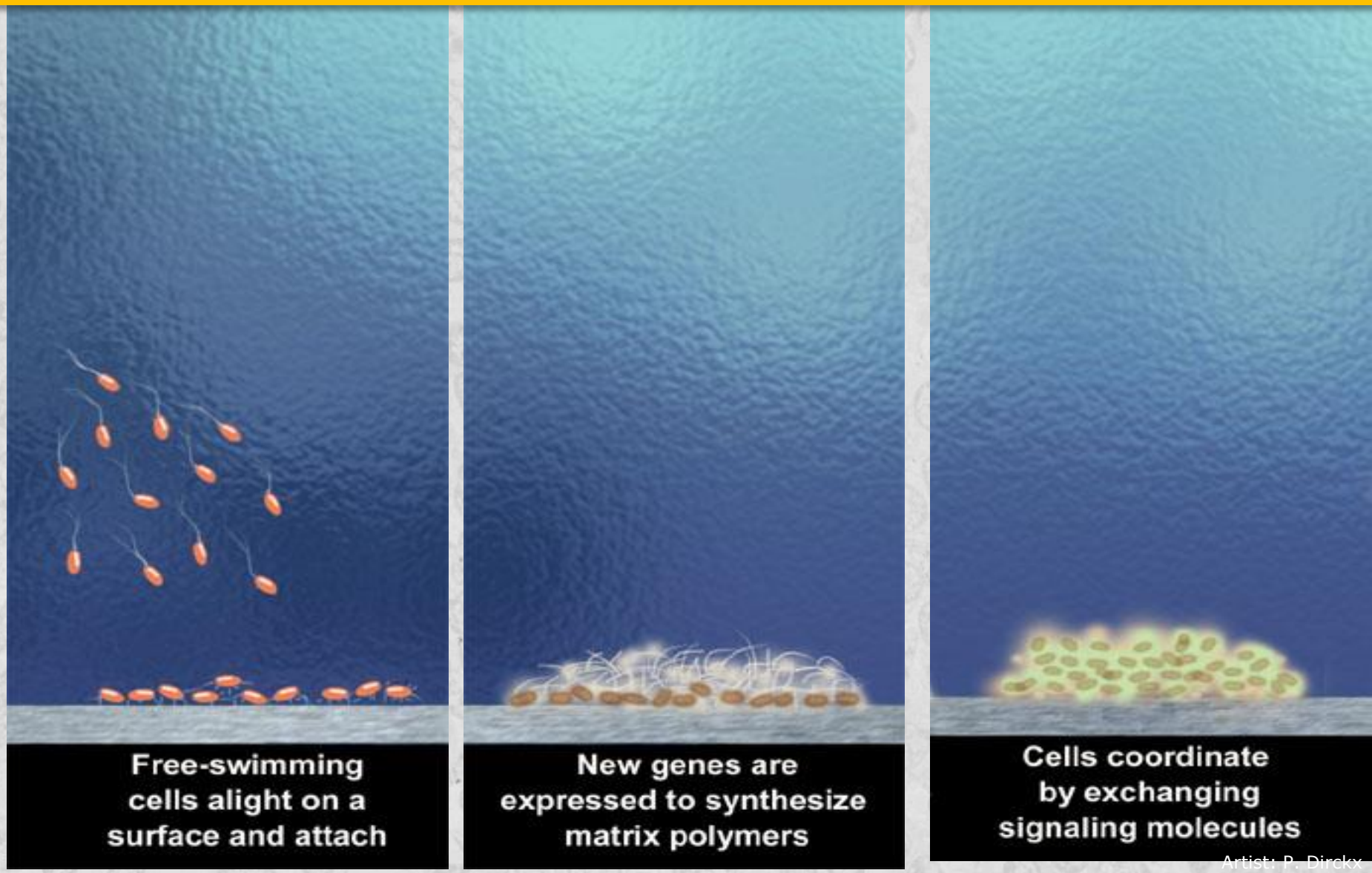
Biofilms

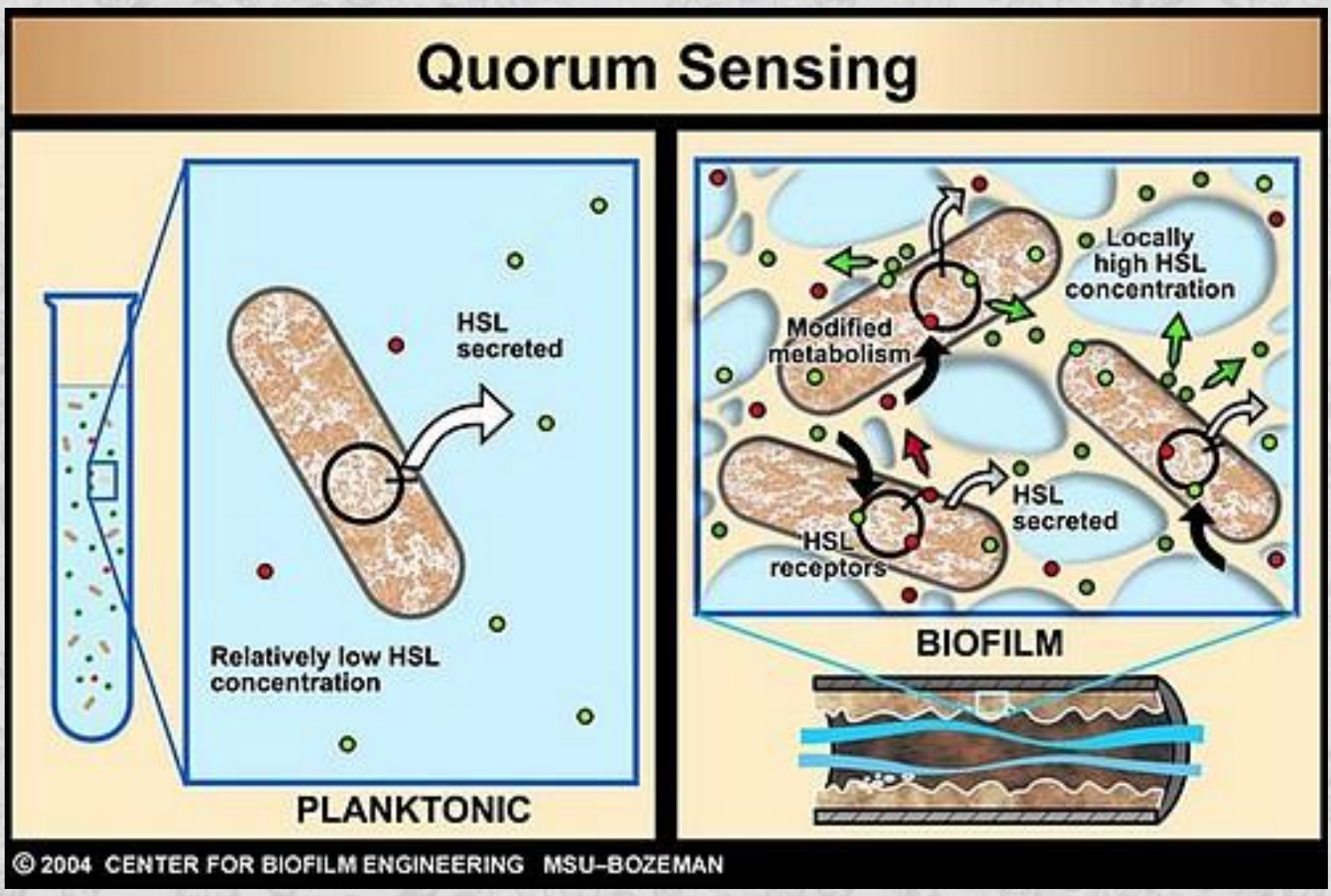
Diane K. Walker
Research Engineer
Standardized Biofilm Methods Lab
Montana State University

IAFP Webinar| June 8, 2021

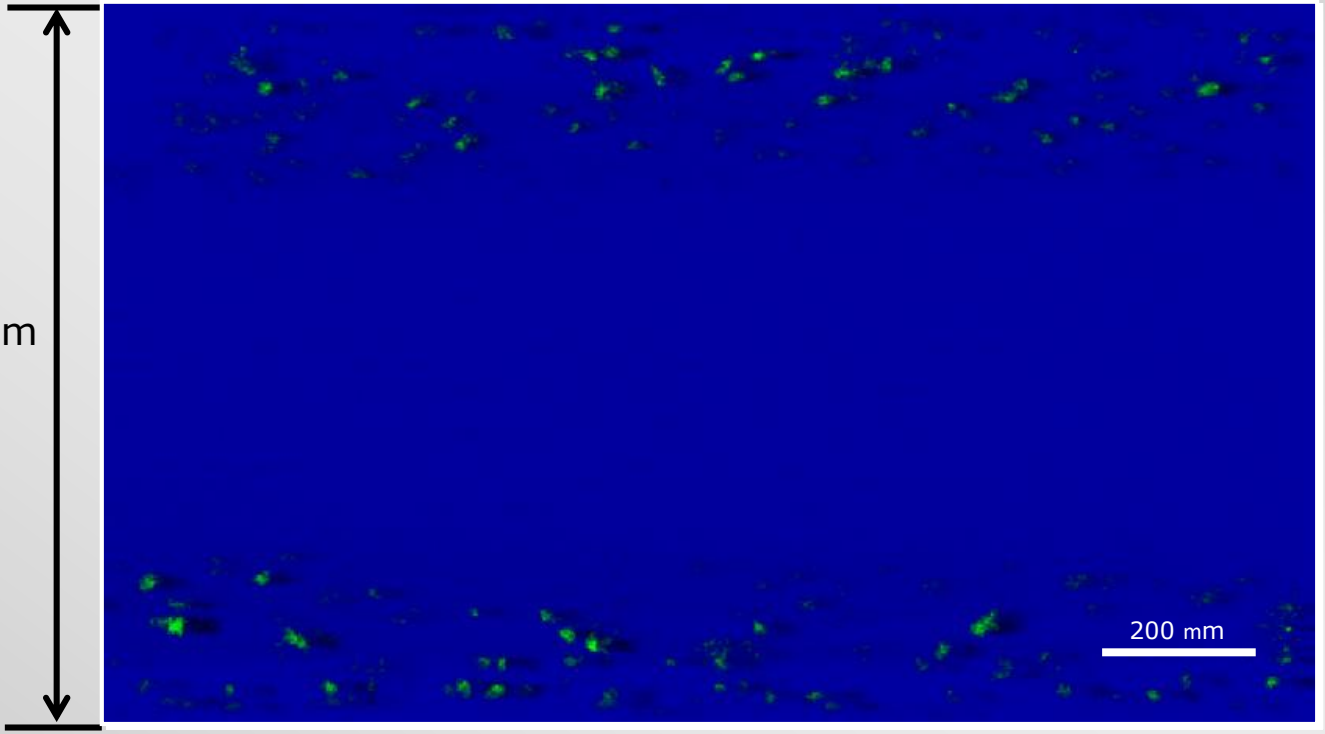


Biofilms are a self-organized, community of microorganisms embedded in a matrix of extracellular polymeric substances.


Free-swimming cells alight on a surface and attach
New genes are expressed to synthesize matrix polymers
Cells coordinate by exchanging signaling molecules
Artist: P. Dirckx


Quorum Sensing
HSL secreted
Relatively low HSL concentration
PLANKTONIC
Locally high HSL concentration
Modified metabolism
HSL secreted
HSL receptors
BIOFILM
© 2004 CENTER FOR BIOFILM ENGINEERING MSU–BOZEMAN

Pathogen Survival in Biofilm



T = 72 hrs

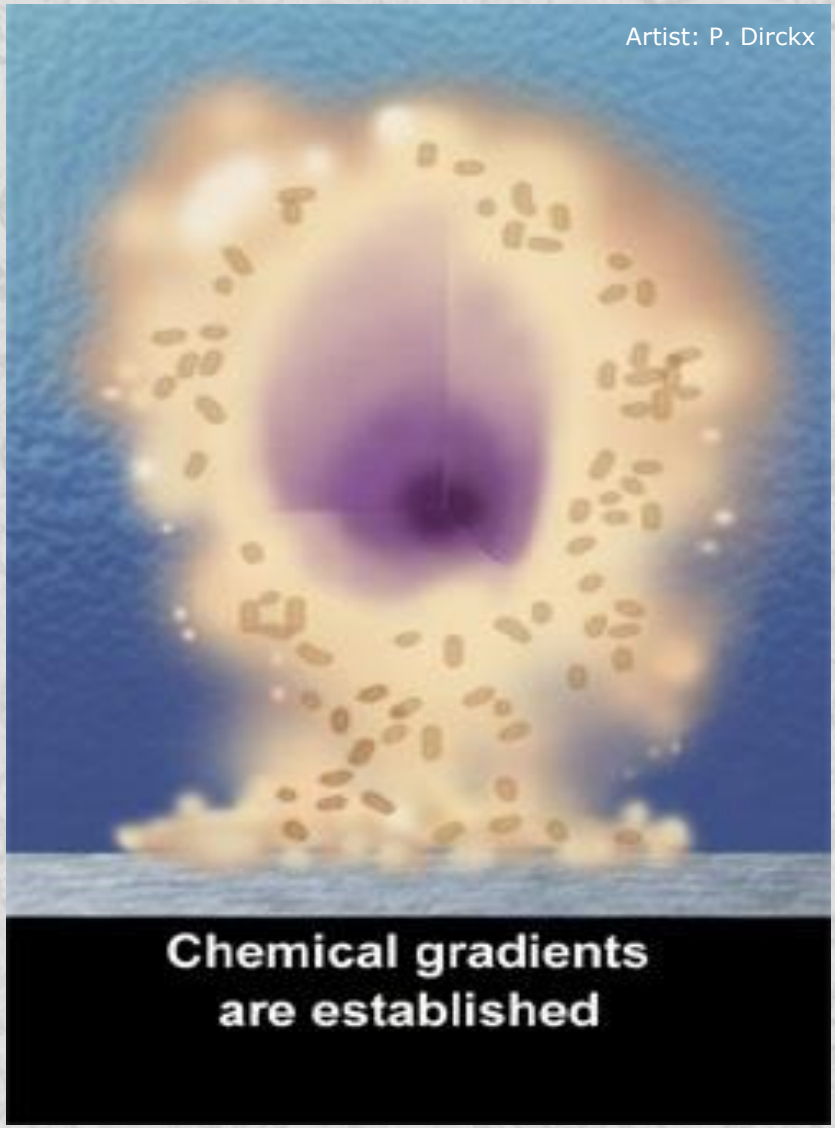
Green is *gfp P. aeruginosa* PA01
Red is *dsRed E.coli* 0157:H7

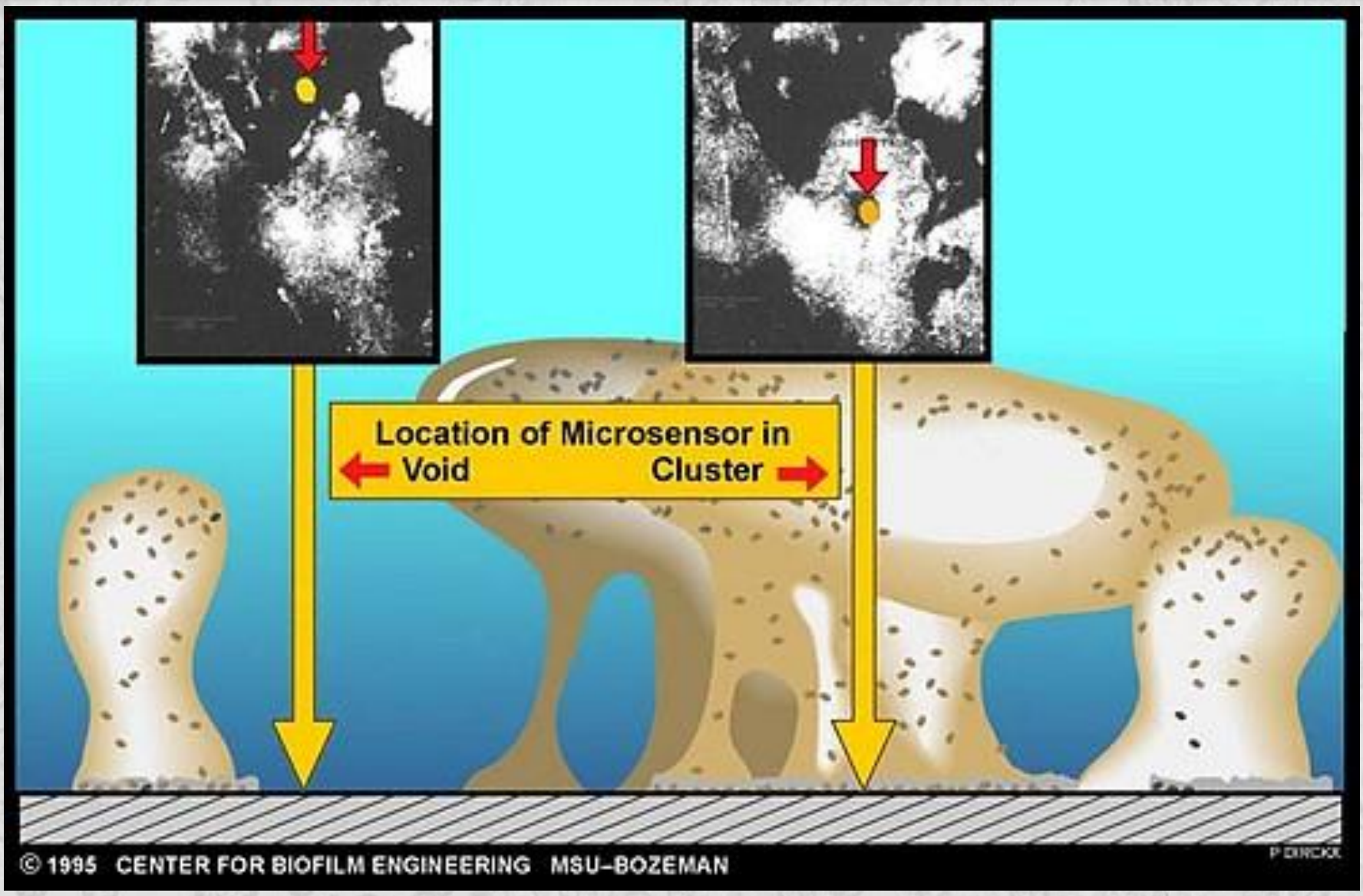
Klayman BJ, Volden PA, Stewart PS, Camper AK, "Escherichia coli O157:H7 requires colonizing partner to adhere and persist in a capillary flow cell," Environ Sci Technol 2009; 43(6):2105–2111

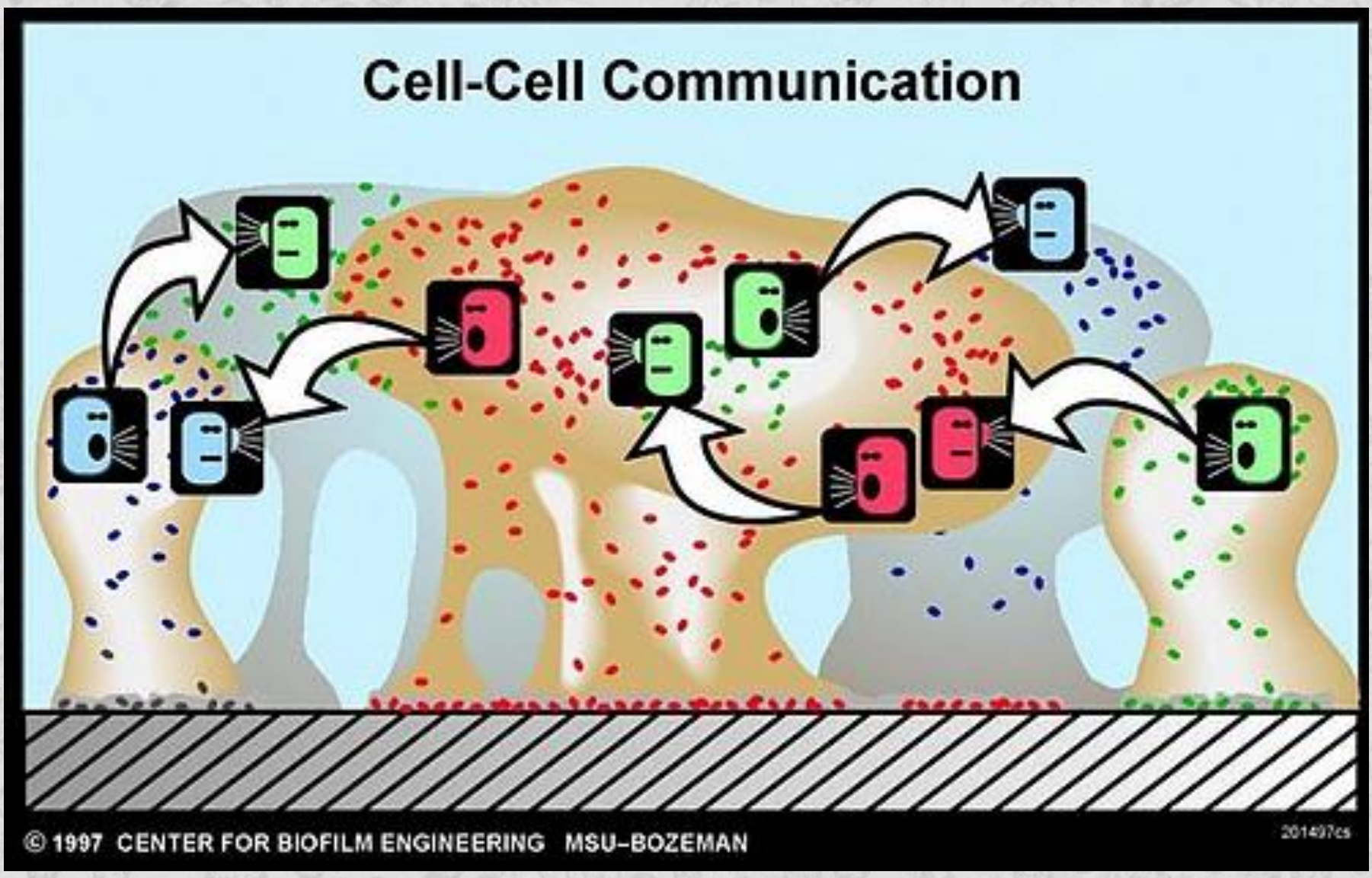
Ben Klayman

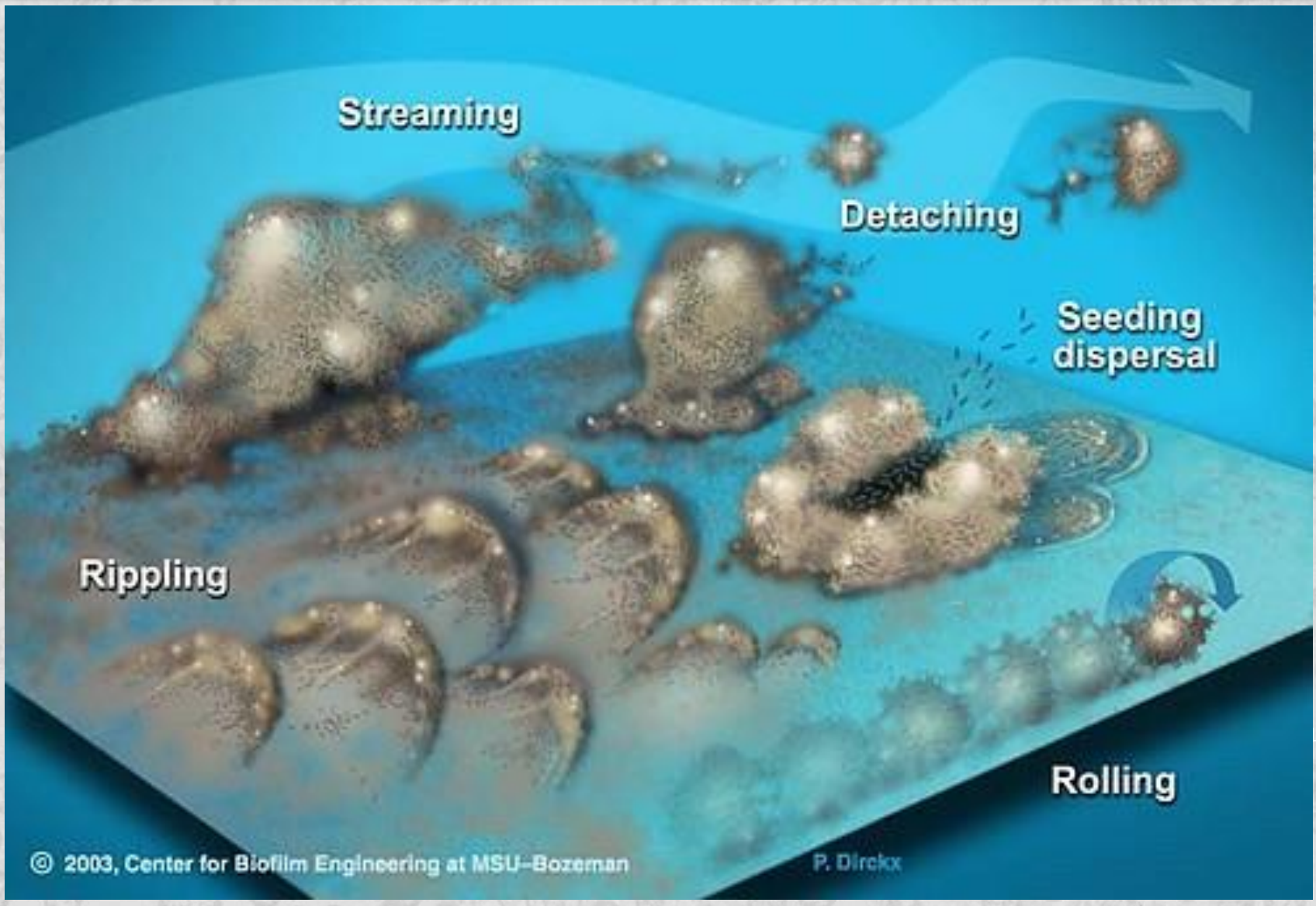
SBML


Bacteria reproduce
and form
microcolonies

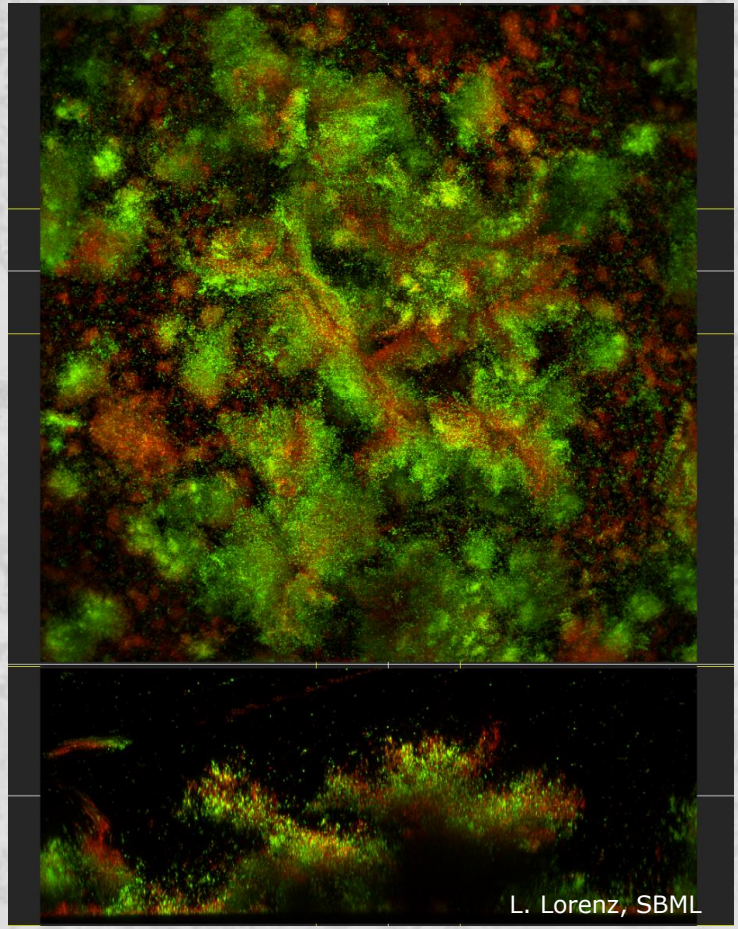

Artist: P. Dirckx
Chemical gradients
are established

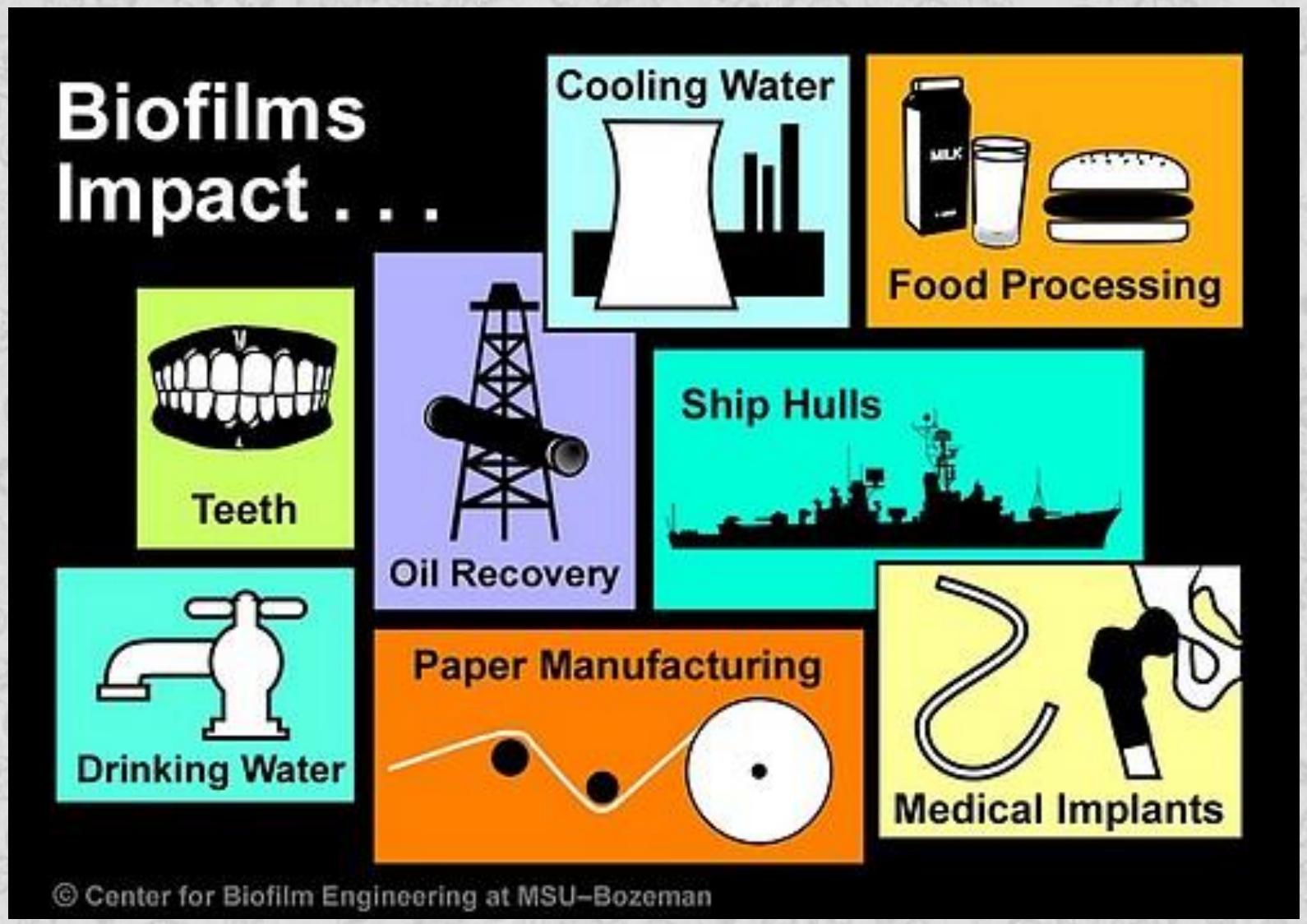

Location of Microsensor in
Void
Cluster
© 1995 CENTER FOR BIOFILM ENGINEERING MSU–BOZEMAN

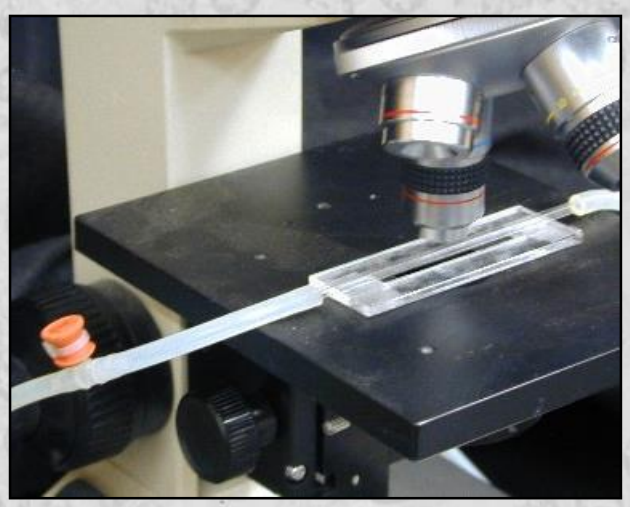

Cell-Cell Communication
© 1997 CENTER FOR BIOFILM ENGINEERING MSU–BOZEMAN
201497cs

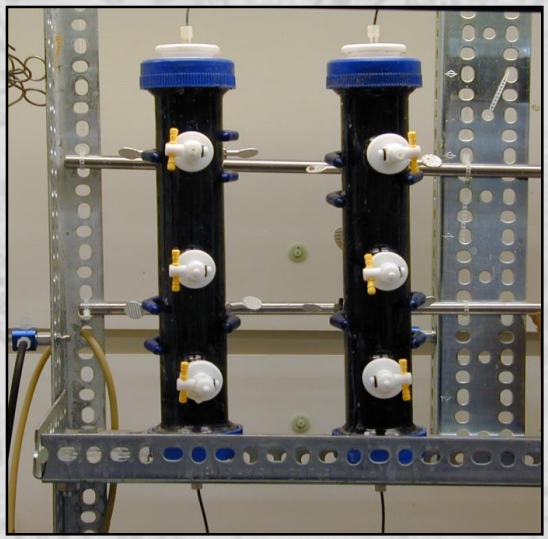

Streaming
Detaching
Seeding
dispersal
Rippling
Rolling
© 2003, Center for Biofilm Engineering at MSU–Bozeman
P. Dirckx

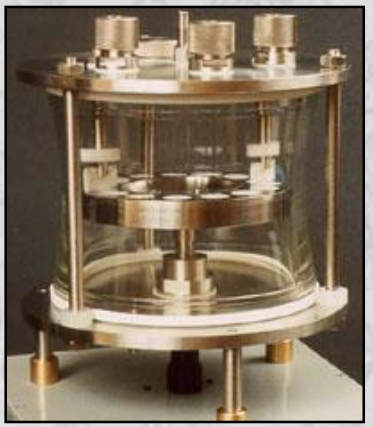

P. Dirckx '00
Cells dissolve matrix
and are released

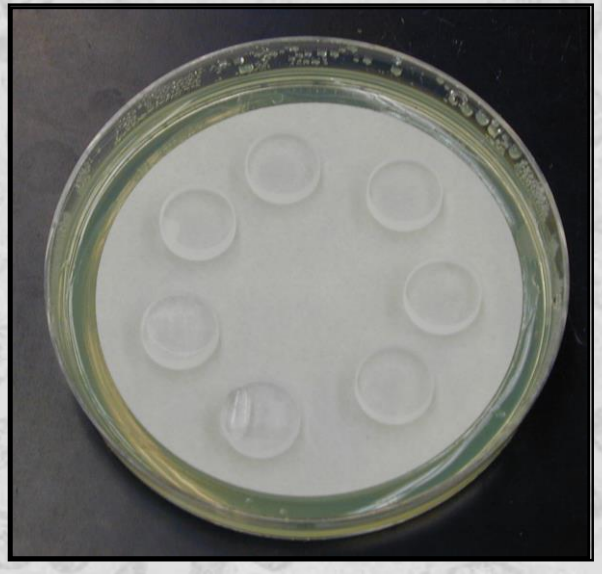

L. Lorenz, SBML


Biofilms Impact . . .
Cooling Water
Food Processing
MILK
Teeth
Oil Recovery
Ship Hulls
Drinking Water
Paper Manufacturing
Medical Implants
© Center for Biofilm Engineering at MSU–Bozeman

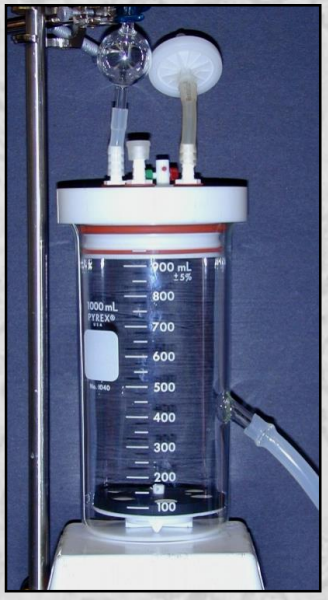




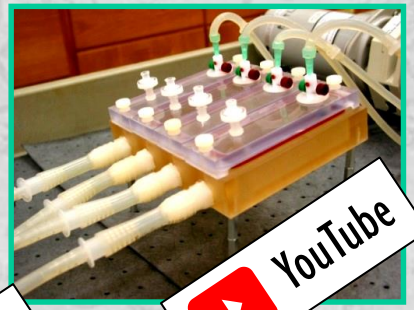


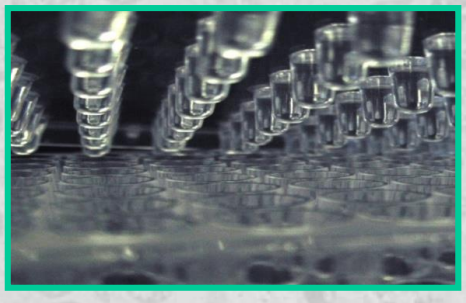


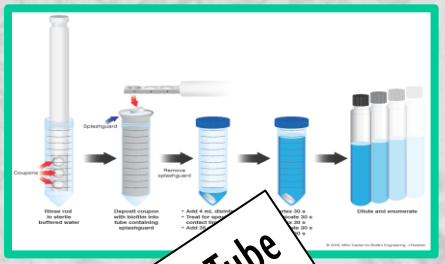

BIOSURFACE
Bio-FLEX®


900 mL
±5%
800
700
600
500
400
300
200
100
1000 mL
PYREX®

ASTM Biofilm Methods







2002 Rotating Disk Reactor E2196

2007 CDC Reactor E2562

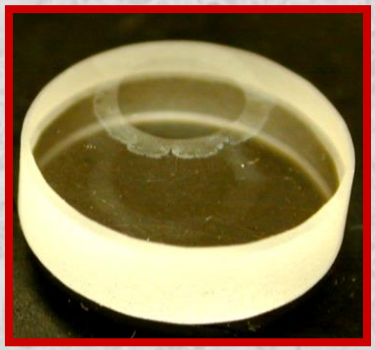
2008 Drip Flow Reactor E2647

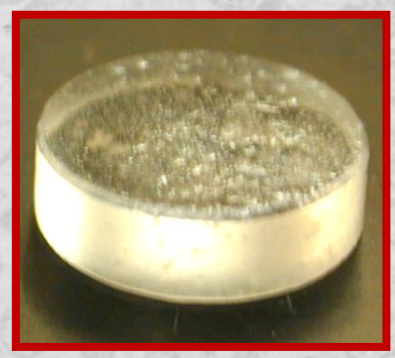
2011 MBEC Assay E2799

2013 Single Tube Method E2871

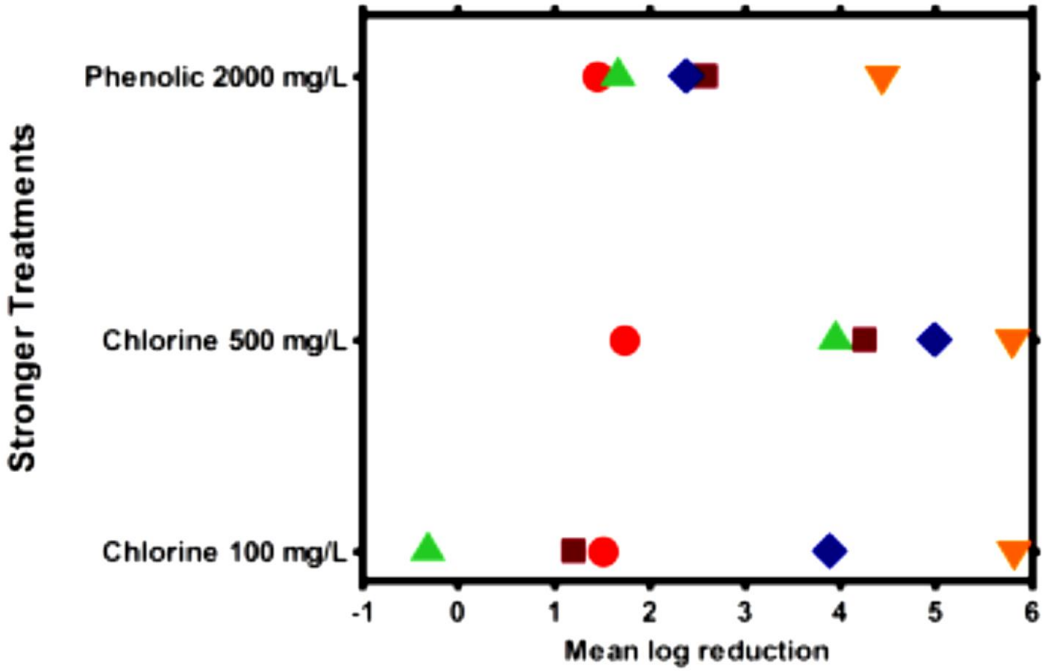
Fluid shear is important

Static Biofilm No Shear	Drip Flow Biofilm Low Shear	CDC Biofilm High Shear





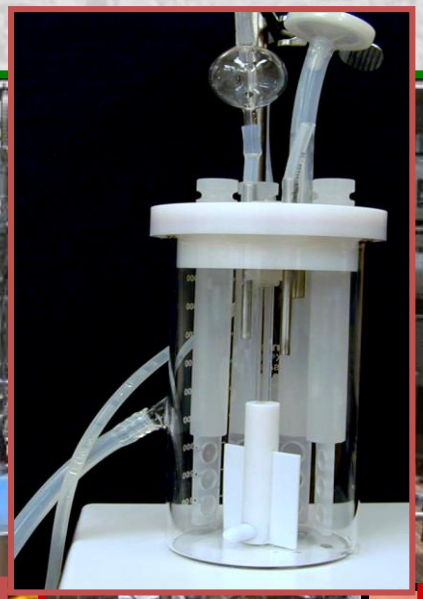
Parallel Reactor Efficacy Study



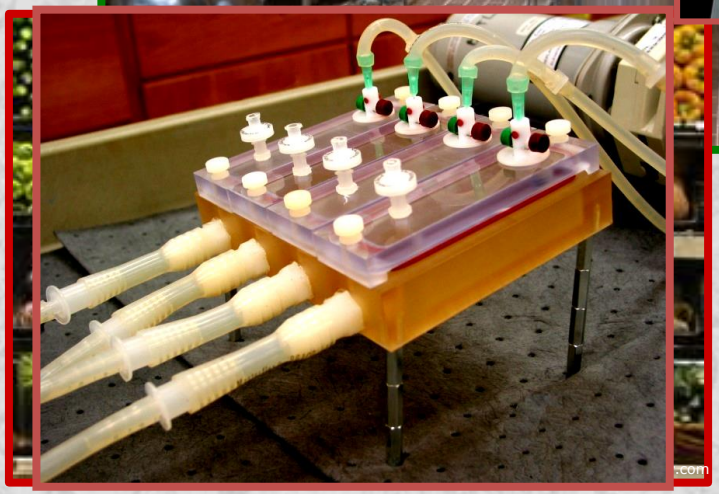
- CDC reactor
- CDC reactor (dried)
- Drip flow reactor
- Static biofilm reactor
- Dried surface bacteria

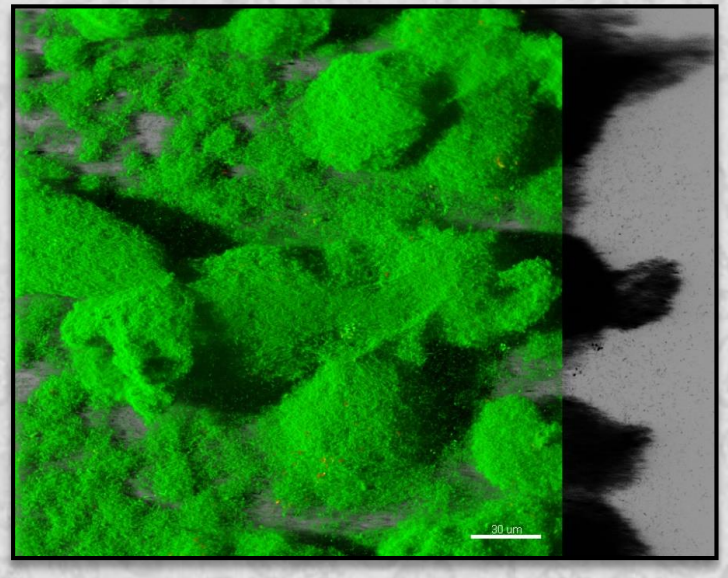
Disinfectant efficacy depends upon how the biofilm was grown

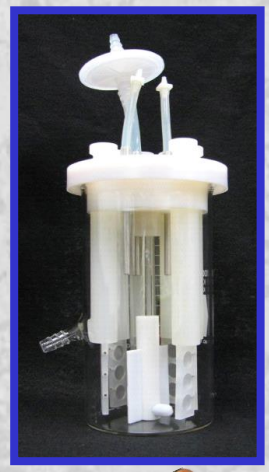

amazon.com

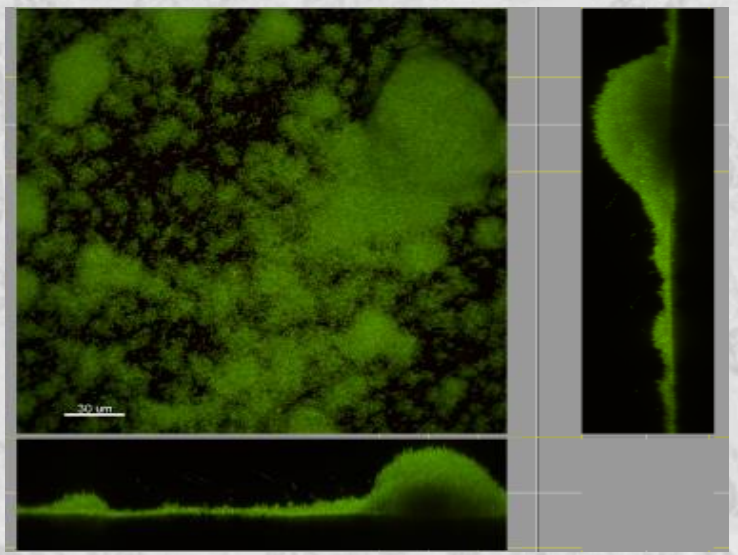



flickr.com

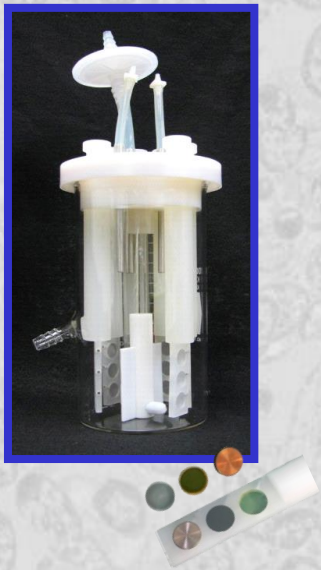




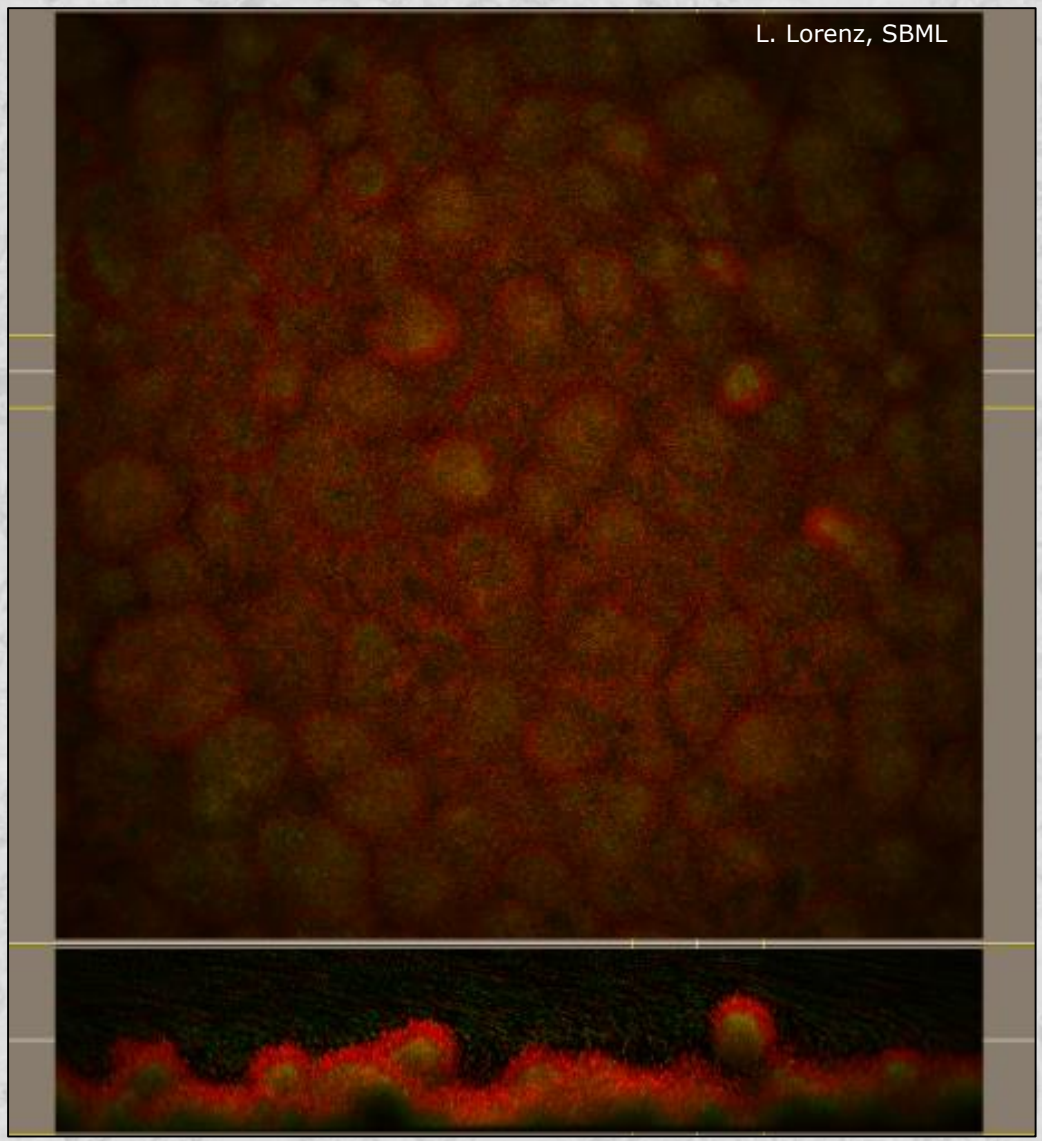


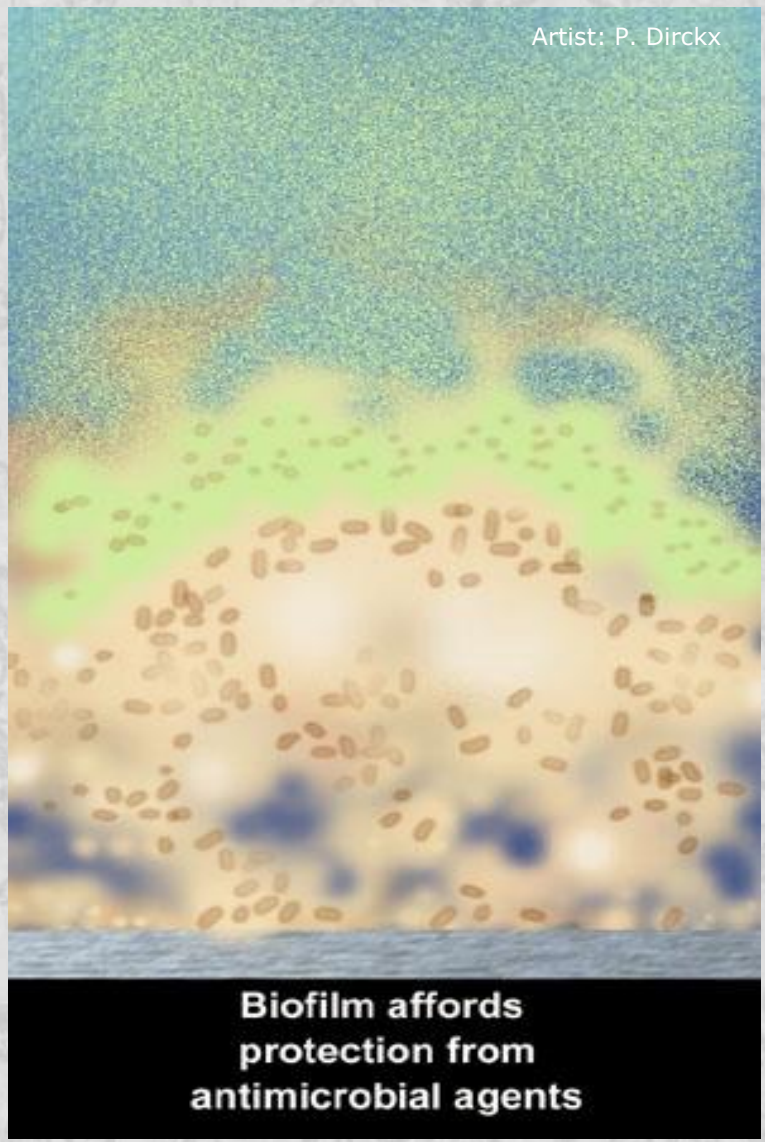


Surface Material	Log Density ($log_{10}CFU/cm^2$)
Polycarbonate (left)	8.58
Stainless Steel (right)	7.89
Polypropylene	8.01
Borosilicate Glass	8.23

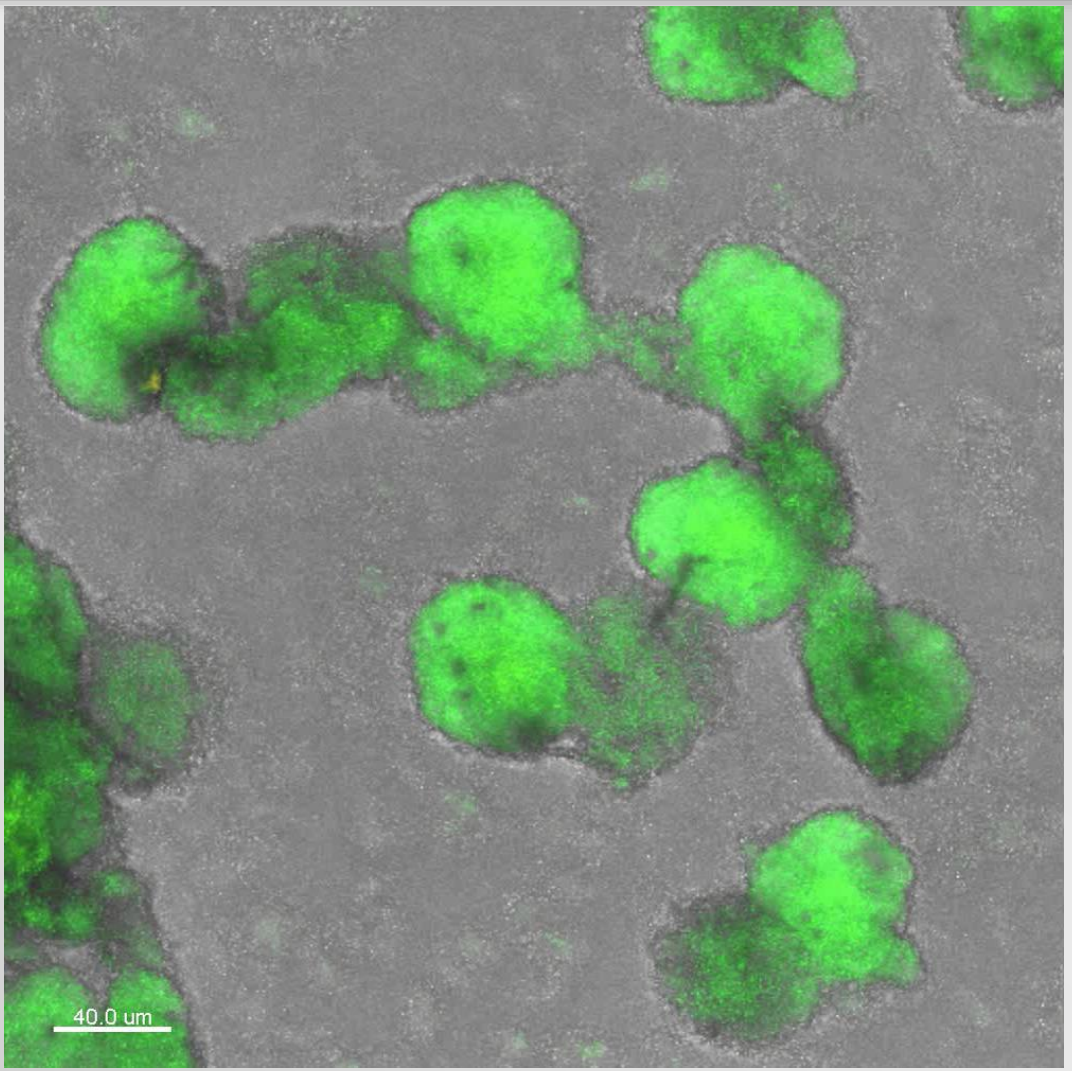


Surface Material	Log Density ($log_{10}CFU/cm^2$)
HALAR (ECTFE)	7.40
PEEK	6.78
UHMWPE	7.09
ETFE	7.71
Ceramic	8.50
PVDF	9.25

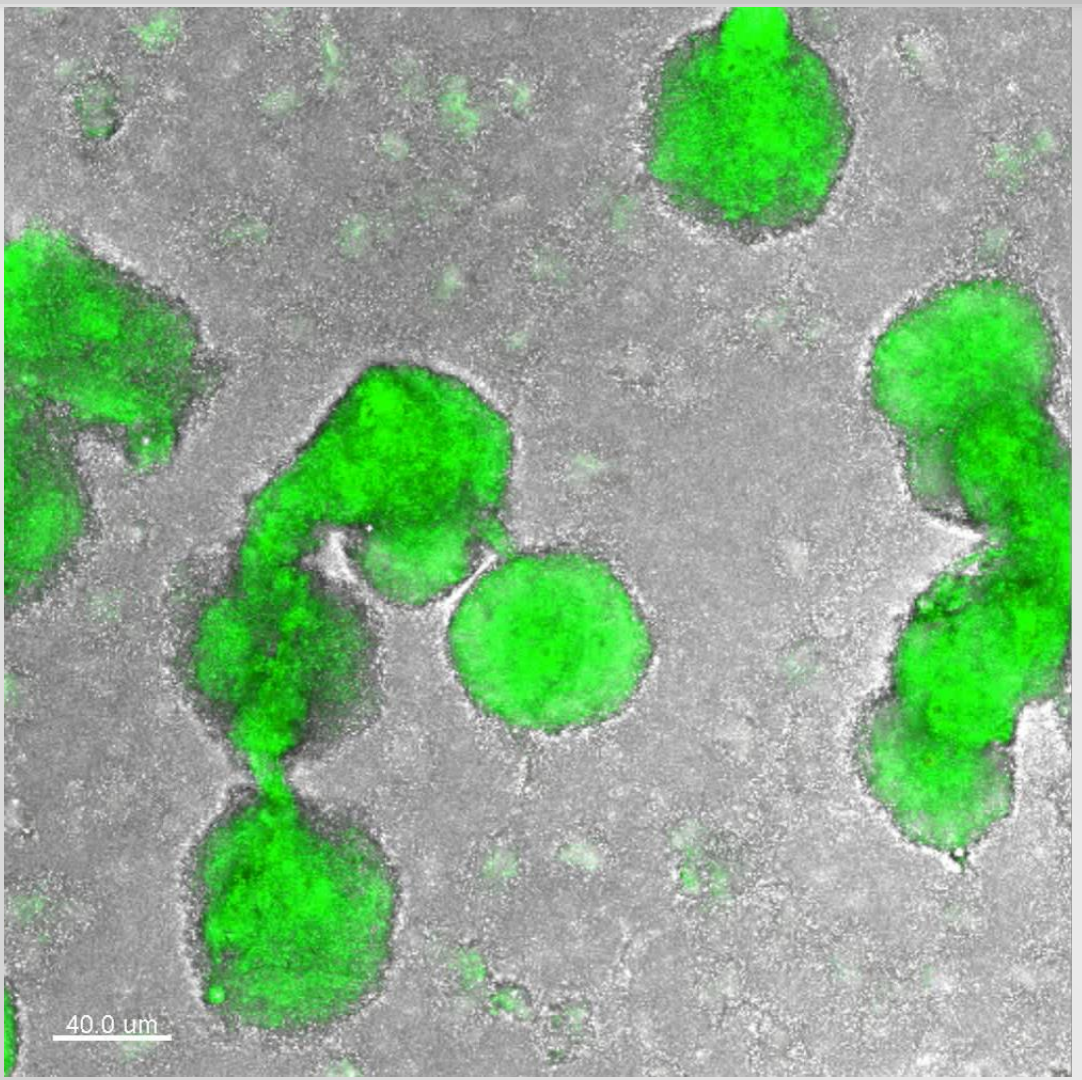

L. Lorenz, SBML


Artist: P. Dirckx
Biofilm affords
protection from
antimicrobial agents

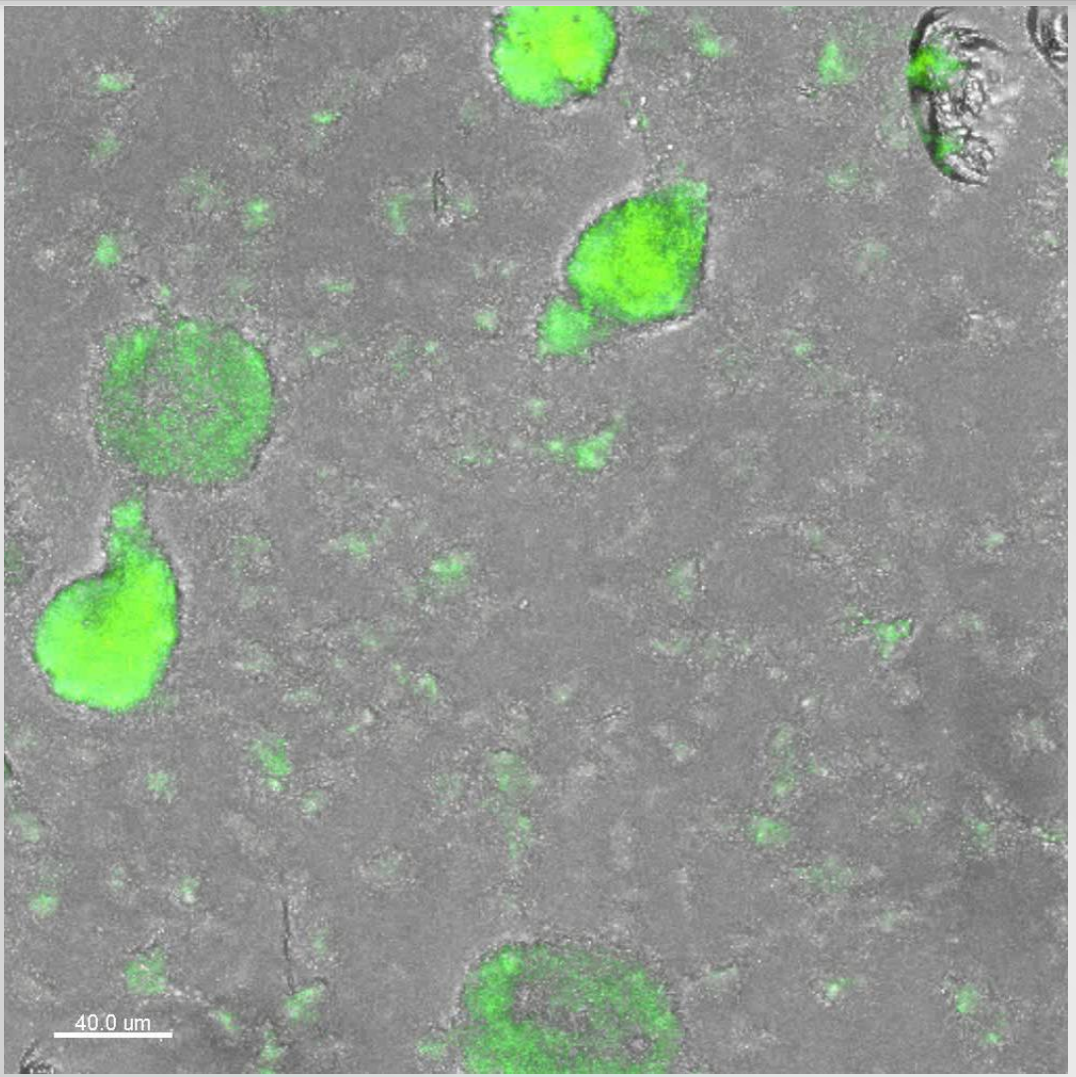
Movie: Alcohol/Quat blend (undiluted)

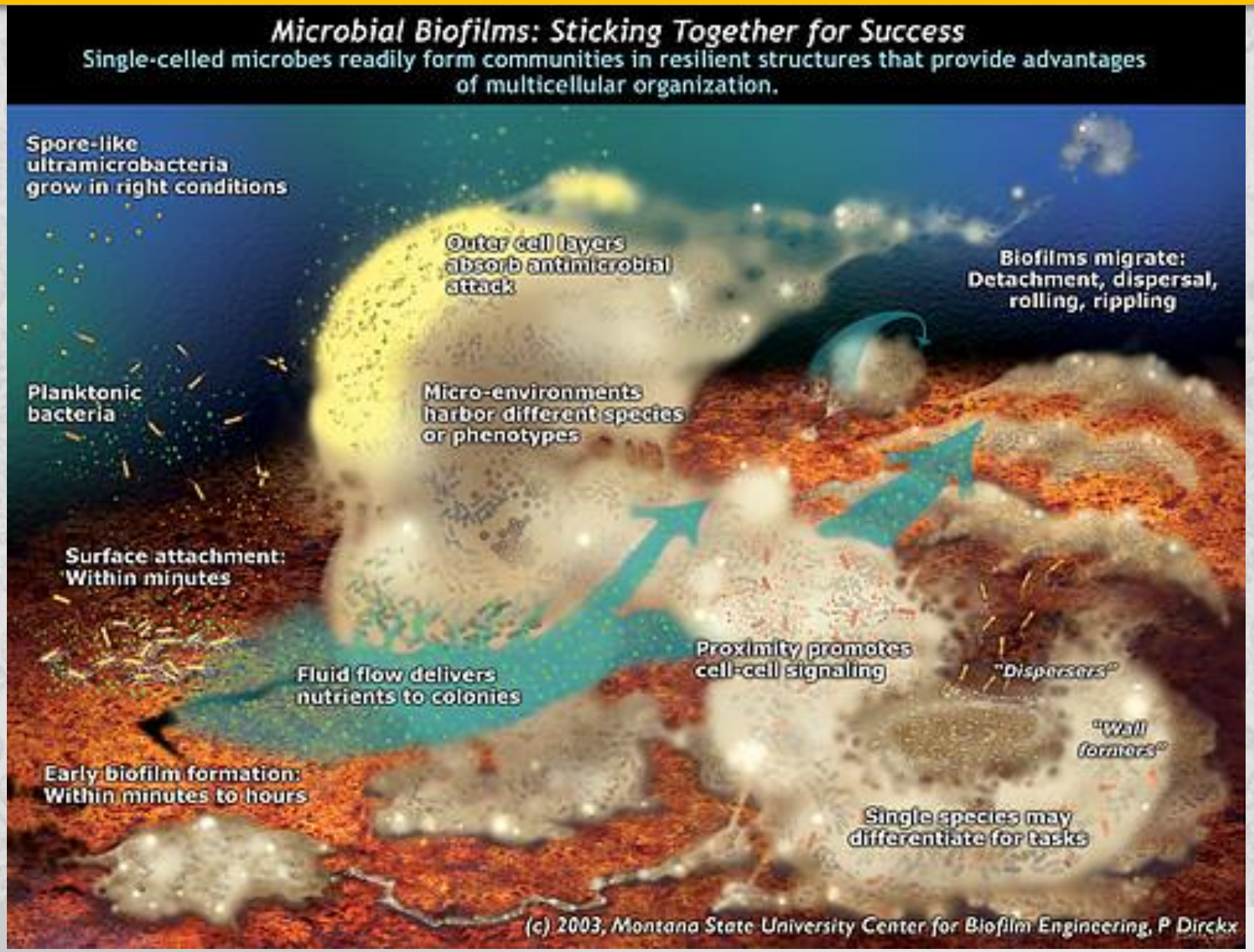


Movie: Phenolic disinfectant (1:16)



Movie: Chlorine (1:20)




Microbial Biofilms: Sticking Together for Success
Single-celled microbes readily form communities in resilient structures that provide advantages of multicellular organization.
Spore-like ultramicrobacteria grow in right conditions
Outer cell layers absorb antimicrobial attack
Biofilms migrate: Detachment, dispersal, rolling, rippling
Planktonic bacteria
Micro-environments harbor different species or phenotypes
Surface attachment: Within minutes
Proximity promotes cell-cell signaling
"Dispersers"
Fluid flow delivers nutrients to colonies
"Wall formers"
Early biofilm formation: Within minutes to hours
Single species may differentiate for tasks
(c) 2003, Montana State University Center for Biofilm Engineering, P Dirckx

Thank You!

MONTANA STATE UNIVERSITY

CENTER FOR BIOFILM ENGINEERING

biofilm.montana.edu

Standardized Biofilm Methods Lab:

Darla Goeres
Paul Sturman
Al Parker
Kelli Buckingham-Meyer
Lindsey Lorenz (Miller)
Diane Walker

"See" you in Phoenix!

Phoenix • Arizona
IAFP 2021
JULY 18-21

PosyGlobal
Regulatory & Compliance Services

I thought it was Sanitary!

Processing Water:
Assessing Risk for Biofilms in Food/Dairy Processing:
Why and How?

Phyllis B. Posy
President, PosyGlobal

International Association for Food Protection®
WEBINAR

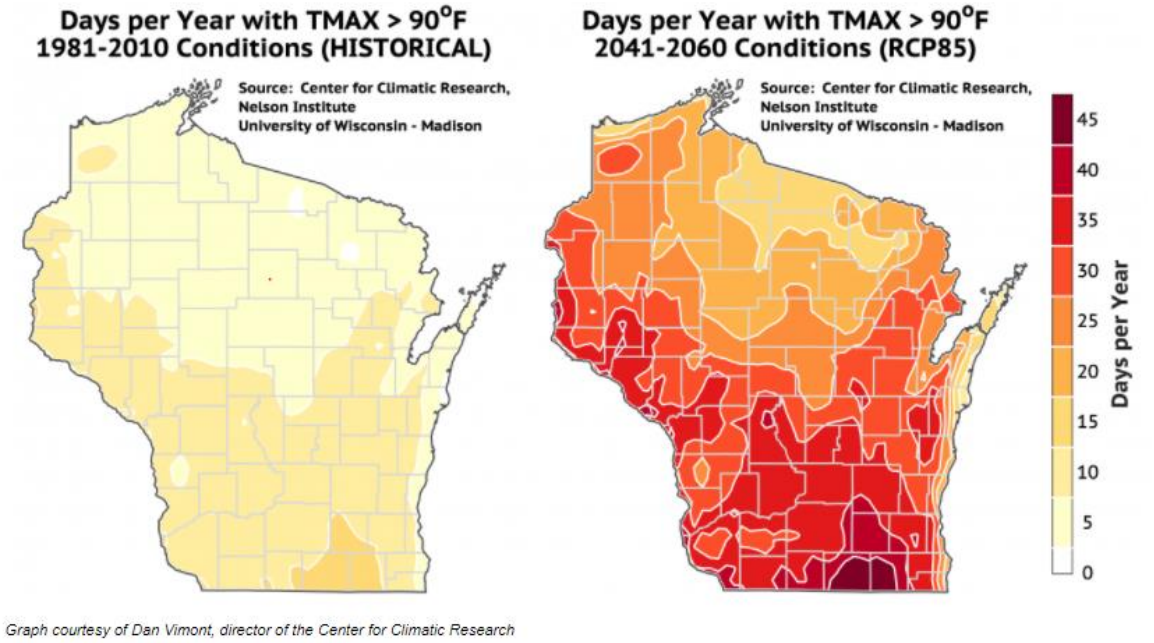

PosyGlobal
Leveraging 5 decades of experience answering the need for practical ideas that make things work better. Helping dairy companies turn water into a resource.

Practical side of Biofilm Risk Assessment

- Context: Biofilm RA in a changing world
- Step 1: Choose a focus
- Step 2: Analyze your water supply
- Step 3: Evaluate your vulnerability
- Step 4: Develop/Evaluate strategies

Context: The World Has Changed

- **Customer requirements have changed**
  - Clea ions”
  - Diff
- **Rese away!**
  - Lots 46 on
    spec es
  - Befc
  - WG
- **Climate Change**
  - Temperature extremes; precipitation extremes
  - More feed contamination
  - Somatic cell counts rising require more antibiotics
  - Gene transfer promoting resistance to treatments



Graph courtesy of Dan Vimont, director of the Center for Climatic Research

Context: Do you *REALLY* have to worry?

- **Similarities with Standard RA:**
  - Aggregate; data-based; action oriented
- **Critical Differences:**
  - MRA: compliance indicators; bacteria; additive; only amounts above the threshold carry real risk
  - BF RA: interactive; cumulative; any amount carries risk slow operations; spoil product; cause loss
- **Does current system address history or today?**
- **Key directional questions: Are you**
  - Relying on municipal water without further testing?
  - Using coliform testing as the key indicator?
  - Reducing time dedicated to cleaning/QA?
  - Extended operational runs since the last HACCP Plan?
  - Updating facilities regularly?

Practical side of Biofilm Risk Assessment

- Context: Biofilm RA in a changing world
- Step 1: Choose a focus
- Step 2: Analyze your water supply
- Step 3: Evaluate your vulnerability
- Step 4: Develop/Evaluate strategies

Step 1: Pick a Corollary Goal/ Focus

- **Recognize your culture:**
  - Never have any processing lapses
  - A little more chlorine will kill it all off….
  - We had some occasional counts… nothing serious
  - Climate Change won't affect us
  - If it is not completely broken, trying to fix it will make it worse
  - Rinsing with lots of water will prevent biofilms
- **Dizzying array of tools**
- **Understand your organization**
  - What would be meaningful?
- **Define a corollary goal**
  - Intractable even nuisance problem
  - Operational optimization
  - Reuse water planning
- **Generate support for a serious risk assessment**
- **Keep focus on the target and how the RA ties to it!**

Practical side of Biofilm Risk Assessment

- Context: Risk Assessment in a changing world
- Step 1: Choose a focus
- **Step 2: Analyze your water supply**
- **Step 3: Develop a Data Plan**
- **Step 4: Make it a habit over the long term**

Step 2: Analyze your water supply

- **Depend on Municipal /WHO potable water?**
- **Differ with official FDA/FSMA position (as does the EPA)**
- **Can standards designed to make water safe for individuals be applied to food processing facilities?**
  - US rules make no distinction between food manufacturing facilities and a single home: a service connection is a service connection.
  - A PWS serving 10 households and a large food processing/manufacturing facility has the same testing/monitoring requirements as a supplier that serves 11 households and no manufacturing facility.
  - PWS focus on Fecal e coli, will not indicate salmonella, listeria, bacillus or pseudomonads, masking biofilm, spoilage, even potential food safety risk.
  - Sampling, analysis and reporting timing mean that pipes would be inoculated and even product shipped before you can take action.
- **If you depend on external water sources without further testing/tracking you are at high risk for biofilms**

Do Municipal Water Rules Protect Food Processing?

- Wl
- Me

International Association for Food Protection

owup

IAFP2017 ANNUAL MEETING Tampa, Florida July 9 - 12, 2017

Navigation

Start

Browse by Day

Author Index

Between RTCR (Revised Total Coliform Rule) and FSMA: The Hole in the Middle

Wednesday, July 12, 2017: 8:30 AM-10:00 AM

Primary Contact: *Ewen Todd*

Organizers: *Phyllis Posy , Dorothy Wrigley and Ewen Todd*

Convenor: *Phyllis Posy*

This session will confront the generally accepted position that if water is good enough to drink, it is good enough to use for food processing. Speakers will analyze the data on whether/how the gap between EPA Drinking Water and FDA FSMA policies leave a hole in the middle that can compromise food safety and dialogue about solution models. The Revised Total Coliform Rule (RTCR; effective 4/2016) refocuses the Safe Drinking Water Act criteria on fecal *Escherichia coli* as the exclusive indicator for compliance. It changes requirements for public notification when samples are positive in favor of triggered assessments ("find and fix"). Users could never know that microbially contaminated water was provided, except from the annual water quality report a year or more later. While impact on individuals drinking might be minimal, food processors, especially small and medium manufacturers relying on municipal water, could be contaminating their pipes and products. Municipal water can be used for processing (food contact or even ingredient water) without any risk assessment because FSMA specifically excluded municipal water users from requirements to address water in their written Food Safety Plans. In reality, not all municipal water is disinfected and public water suppliers must be compliant with treatment requirements only 95% of the time. Recent research in Minnesota and Wisconsin found EPA compliant water, when not disinfected, can be contaminated with Salmonella and other organisms of concern. Viable pathogens can infiltrate, through non-point sources or through the hydraulic action of high service pumps, and go undetected by EPA standard testing. Our current statistics do not capture the link between food outbreaks where the underlying transmission agent or amplification is in the "drinking water". Here, EPA, FDA, and FSIS panelists discuss: How big is the hole in the middle and can it compromise food safety? What should we do about it?

Presentations

8:30 AM — What is in Drinking Water that Could Matter: The Minnesota Virus Study
Mark Borchardt, US Dairy Forage Research Center, USDA-Agricultural Research Service

9:00 AM — Do We Only Find What We Are Looking for?
Vincent Hill, Division of Foodborne, Waterborne and Environmental Diseases Centers for Disease Control and Prevention

9:30 AM — Solutions Panel: Is There an Addressable Gap and What are Options and Models for addressing it?

Moderator: Phyllis Posy

Strategic Services & Regulatory Affairs Atlantium Technologies, Vice Chair Water Safety and Quality PDG

EPA Perspective: Dr. Julie Javier

abel

ds that
ility

in

- Timing is not on their side

The Chinks in the Armor

Wisconsin WAHTER Study

Does Groundwater-borne Illness Risk Meet EPA Standards?

- Acceptable EPA risk for waterborne disease is 1 infection in 10,000 people/year
- Assume every infection leads to an illness, then the acceptable illness rate is 0.0001 illness/person-year
- In the spring of 2006 the WAHTER Study measured 0.44 illness/person-year in children < 5 years old that was attributed to groundwater
- 4,400 times higher than EPA acceptable risk

Minnesota Study: What's in "Safe Drinking Water"?

- Follows basic concept of the WATHER study
  - 74% of the population relies on municipal groundwater
  - 567 PWS do not disinfect; 243 community; 324 NTNC
  - 82 wells in study – 14.7% of the systems
  - All compliant – no e coli (none triggered the GWR)
- Tested for: Human Enteric Viruses Adenovirus Group A –F; Enterovirus; Norovirus GI & GII; Hepatitis A ; Human Polyomavirus ; **Rotavirus; *Salmonella* spp. ; *Campylobacter jejuni* ; Enterohemorrhagic *E. coli* (EHEC);** Bovine *Bacteroides;* M3 *Bacteroides*-like; Bovine polyomavirus; Pepper mild mottle virus; Total coliforms and *E. coli*
- ***66% wells positive for a target; 20% positive for salmonella;***
- **Of those, 60% TCR positive but NONE positive for e coli**

Is All Municipal Water Compliant?

- **Overall compliance gaps triggered April 2021 Compliance Advisory**
  - FY2020: 34% violated at least 1 standard
  - 7% health violations (21 million people)
  - Reporting violation are "cheaper" than a hit
  - Many violations under the radar: 5% rule
- **Survey of Compliance in 2015 in 3 top dairy states**
  - State Detection Database used; survey of dairies/ farms and processors
- In one state, over 430 dairy facilities were in areas served by public water systems that had **TCR detections**, did not exceed 5%, so no violations:
  - Detections report pathways
- Second state, of 38 dairies; CCR reports showed half had detections
  - 3 had violations- so three get public notice a year later
- Third state,54 dairies were listed as "public water systems" from 2012-2015: 18 had one or more hits/and/or violations.
- **Check: https//echo.epa.gov ; ewg.org/tapwater**

Does My Supplier Provide the Safety I need?

- **Where does your water come from?**
  - Does your water supplier buy finished water or treat it?
  - Ground Water or Surface? blend or use only one source?
  - How much Defacto Reuse?
  - Understand the treatment process!
  - Does your system disinfect ? With what? To what level?
- **Determine what percent of their output you get?**
- **Where on the distribution system are you located**
  - Are you the end of the line?
  - Are there sampling points nearby that will provide information?
- **Check on your state database for recent detections, violations; check your CCR**
  - Have been any in the past 18 months? Did you know at the time?
  - Determine if there is a realistic way you can stay in the loop so you can – on a timely basis -- evaluate, monitor, verify issues and variability in your specific supply (esp. blending)

Step 3: Evaluate Your Vulnerability

Develop a data plan

- Speciate incoming water to create a benchmark
- Check your QA data against FoodTracker (Thank You Cornell!!)

Listeria monocytogenes	14561 isolates
Pseudomonas spp.	3809 isolates
Vibrio parahaemolyticus	160 isolates
Streptococcus spp.	2938 isolates
Streptococcus agalactiae only	1233 isolates
Lactic acid bacteria	453 isolates
Salmonella spp.	14928 isolates
Bacillus spp.	4161 isolates
Paenibacillus spp.	2502 isolates
Klebsiella spp.	634 isolates
Total isolates	88599 isolates

Counted at 6/6/2021 3:56 AM Eastern Standard Time.

- Speciate in Zones 3&4 before a vacation or break;
- Generic gram neg?

How to Build a Data Plan

- **QA: MAP Micro trail for the last 2 years**
  - Incoming water variability
  - Anomalies can mean persistence
- **MAP Maintenance – repeats/preventive -2 years**
  - Cooling/heating systems: pinhole leaks, joint fixes
- **MAP Engineering –go back 2 years; ahead 2**

  "Normal changes" can be opportunities
  - Deadlegs often ignored in the rush to end
- **MAP Utilities: Water use volume; variability**
  - CIP the most constant, process critical
  - By product/by time of day/by season
  - Flowmeter, records point to gaps
  - Power too!

To determine Vulnerabilities, ask your team:

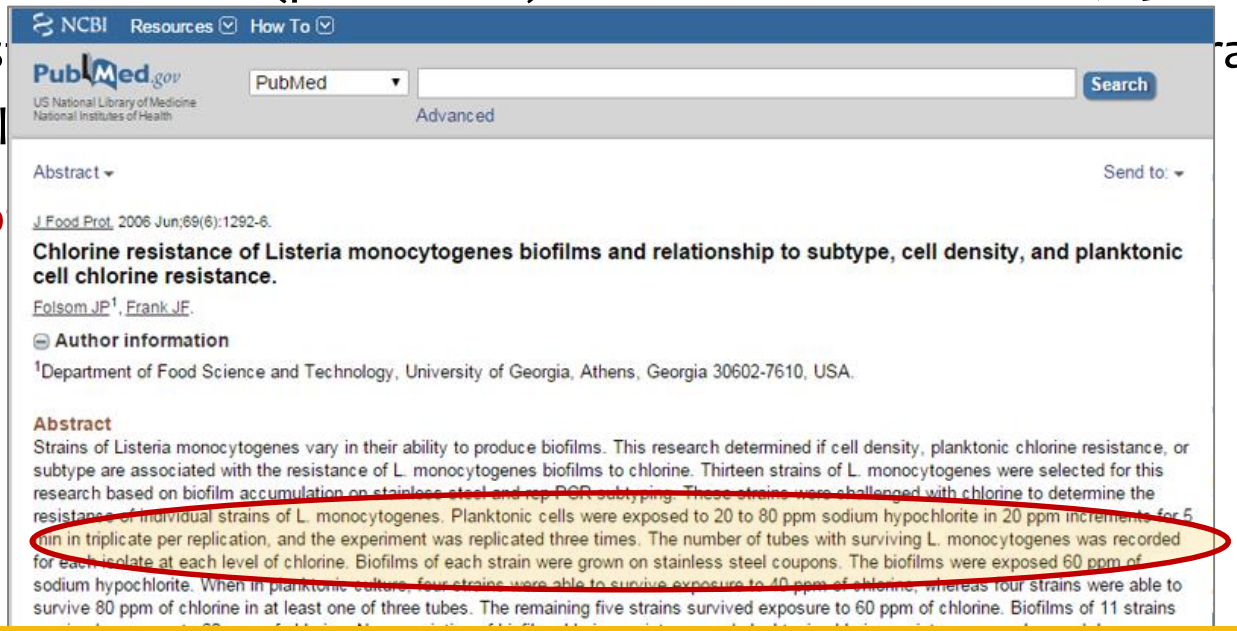
- **Consistency: cleaners & sanitizers evaluated/changed?**
  - Chemicals may remove biological fouling
  - Enzymatic cleaners better for residual elements
  - Frequent changes will control biofilms more than consistency
- **Any inherent risks in your specific products or process?**
  - Storing water(fiberglass, temperature, with/without residual) vents?
  - Ct time and pipe flow rates- will the chemicals really work?
  - Pipe materials- some materials have natural pits
  - Disinfection by products
- **Have you reviewed your system for:**
  - Cross-contamination possibilities: sequential use for diff products
  - Water used in the packaging process
  - Any special relevant incidents or factors?

Evaluate each process component

- **In process contamination/cross contamination/backflow**
  - Power anomalies
  - GAC and other filters? optimum niches for microbial growth
  - Untreated water hoses for cleaning?
  - Water Storage tanks? especially without hepa filters; fiberglass in the sun
  - Heat exchangers with pinhole leaks
  - Ice chillers and cooling processes recirulate
  - RO membranes foul; haven for biofilms; watch flux clean earlier
- **Consider how dynamic your system is**
  - Frequency of product or process changes?
- **Post process contamination**
  - Thermophilic and psychotolerant spores
  - Flushes for post-pasteurization pipes
  - Rely on sheer forces or volume to do the job? Vary!
  - Any pre-rinse water used in later stages?

Step 4: Find the right strategy/tools

- Is chlorine a silver bullet or simply overused?
- In a study by the University of George on resistance of Listeria individual cells(planktonic) and biofilms to chlorine, 13 strains of Lis ration of chl
- Bo



NCBI Resources How To

PubMed.gov
US National Library of Medicine
National Institutes of Health

PubMed Search
Advanced

Abstract Send to:

J Food Prot. 2006 Jun;69(6):1292-6.

Chlorine resistance of Listeria monocytogenes biofilms and relationship to subtype, cell density, and planktonic cell chlorine resistance.

Folsom JP[1], Frank JF.

Author information

[1]Department of Food Science and Technology, University of Georgia, Athens, Georgia 30602-7610, USA.

Abstract

Strains of Listeria monocytogenes vary in their ability to produce biofilms. This research determined if cell density, planktonic chlorine resistance, or subtype are associated with the resistance of L. monocytogenes biofilms to chlorine. Thirteen strains of L. monocytogenes were selected for this research based on biofilm accumulation on stainless steel and rep-PCR subtyping. These strains were challenged with chlorine to determine the resistance of individual strains of L. monocytogenes. Planktonic cells were exposed to 20 to 80 ppm sodium hypochlorite in 20 ppm increments for 5 min in triplicate per replication, and the experiment was replicated three times. The number of tubes with surviving L. monocytogenes was recorded for each isolate at each level of chlorine. Biofilms of each strain were grown on stainless steel coupons. The biofilms were exposed 60 ppm of sodium hypochlorite. When in planktonic culture, four strains were able to survive exposure to 40 ppm of chlorine, whereas four strains were able to survive 80 ppm of chlorine in at least one of three tubes. The remaining five strains survived exposure to 60 ppm of chlorine. Biofilms of 11 strains

Biofilms of each strain were grown on stainless steel coupons. The biofilms were exposed 60 ppm of sodium hypochlorite. When in planktonic culture, four strains were able to survive exposure to 40 ppm of chlorine, whereas four strains were able to survive 80 ppm of chlorine in at least one of three tubes. The remaining five strains survived exposure to 60 ppm of chlorine. Biofilms of 11 strains survived exposure to 60 ppm of chlorine.

Step 4: Find the right Strategies/ Tools

- **Key technologies come in various sizes/combos**
- **Coordinate with Corollary goal**
- **Chemicals may be useful for specific need/processes**
  - Understand what they leave behind, potential impact
  - Change regularly to prevent resistance/assure efficacy
- **Chlorine Dioxide/Ozone, other aggressive treatments**
  - Consider potential product contact; worker exposure
- **Tools**
  - Remember your generator and power supply
  - Filtration – new media/ technologies invented daily
  - Consider particle size, most resistant microbe
  - Investigate synergies; treatment order may be important

Step 4: Pick the Tools

- **UV: Inactivation/ disinfection for water**
  - Non-validated tech: high risk
  - Polychromatic cover broader spectrum, no regrowth
  - Reliable flow meter; control;
  - Pay careful attention to process limits: flow, water quality
  - Computerized monitoring/tracking;
  - Coordinate power
  - Develop good startup/shut down process
- **Validate, Verify and Document**
  - Paper validation; real time verification
  - Continual documentation; watch trends carefully

Bottom Line Reality Check

- **Risk is part of Life**
- **Life is not a Lab**
  - Biofilms won't disappear
  - Don't be afraid of new tech
  - Start with peer reviewed lit; Translate your conditions
  - Credible validation: base paper analysis on process limits
  - Be alert to climate, environmental, water variability
- **Achieving Corollary goal will make the RA work**
- **Pay for Service: more realistic cost comparison**
- **Document from the beginning**
  - If it is not documented, it did not happen

Thank you for your attention!

Please address any reactions, comments and questions to:

Phyllis Butler Posy, President
Phone: +1 347 220 8397, +972 54 665 1071
www.PosyGlobal.com
FSMA: PCQI; FSVPQI **Skype:** Phyllis.Posy

PosyGlobal
Regulatory & Compliance Services

REAL-LIFE MYTHS & COMMON MISTAKES

Food Manufacturing Biofilms

Neil Bogart – Executive Area Technical Support Coordinator

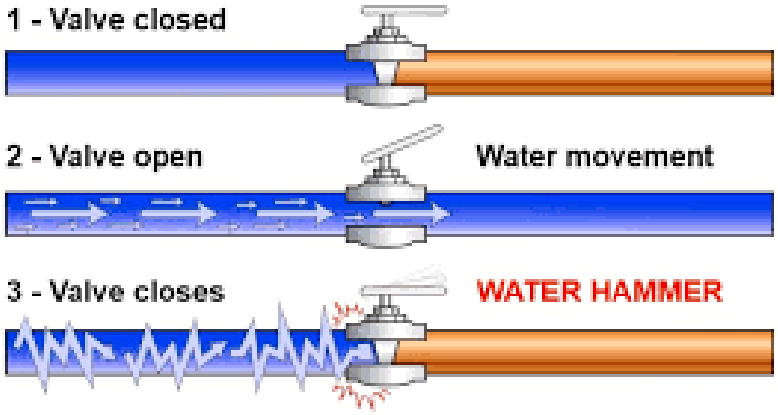
JUNE 8, 2021

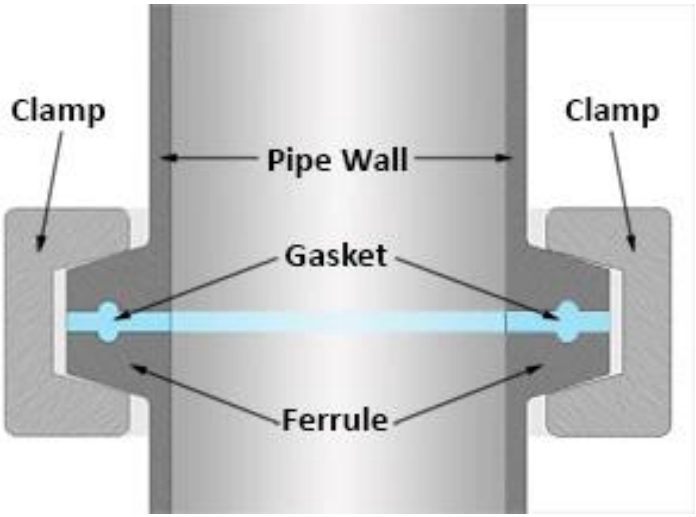
MYTHS & MISTAKES

Water Hammering & Excessive Processing Vibration

My system has hammered for as long as I have been here.

- What is the excessive pressure doing at connections?
  - Could it be creating niches?

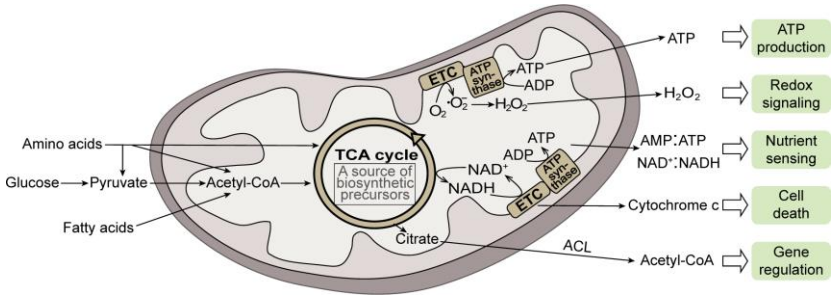




MYTHS & MISTAKES

ATP Verification

I swabbed my equipment after the post rinse and got counts.

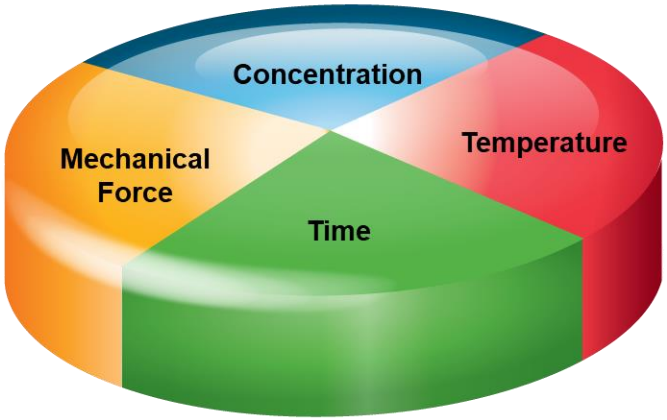


- Plausible
  - Inadequate rinsing times
  - Biofilms in processing water
    - PM of water header
    - CIPable water header
    - Water nozzles
    - Flex hoses
  - UV inactivates, but ATP can still be picked up

MYTHS & MISTAKES

Mechanical Action - Turbulent Flow

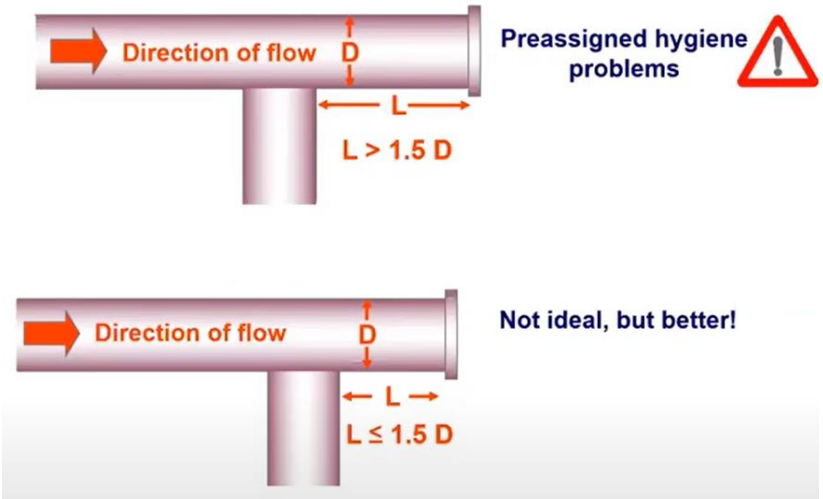
Chemistry alone will remove a biofilm



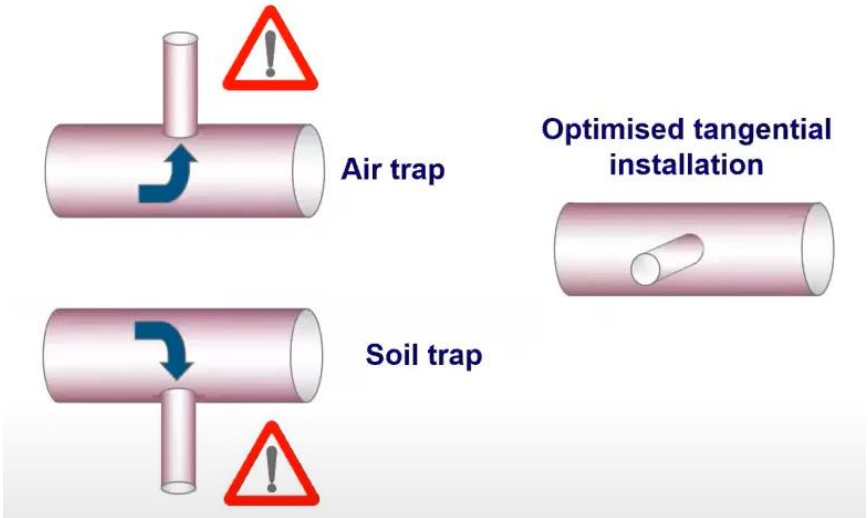
- False: Biofilms can survive saturation with disinfectants.
  - Mechanical action is needed to completely remove a biofilm
- Biofilms attachment to the surface is based off the environment

MYTHS & MISTAKES

Dead Leg Rules



- Any drops or unused portion of any length of piping has the potential for the formation of a biofilm and should be eliminated if possible or have special sanitizing procedures



MYTHS & MISTAKES

Preventative Maintenance Program

Insufficient preventive maintenance

Elastomers

Torque requirements

- PTFE (Teflon)
- Viton
- EPDM
- Buna-N

Typical Applied Torque Settings

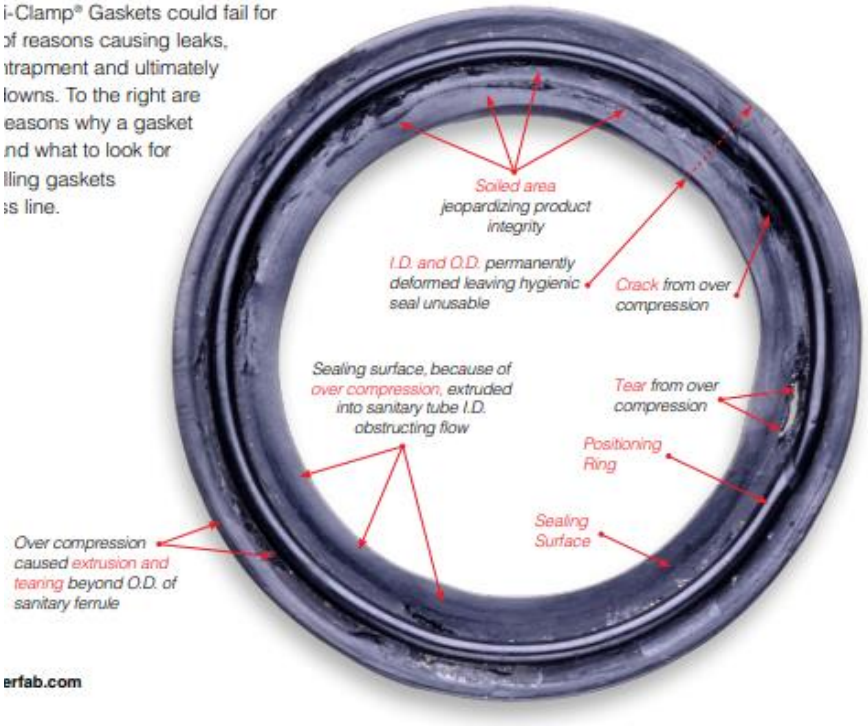
Gasket Material	Torque (in-lbs)
Silicone	25-30
EPDM	30-44
PTFE & PTFE Blends	50+[1]

1. Consult clamp manufacturer for maximum allowed torque settings.

MYTHS & MISTAKES

Preventative Maintenance Program

i-Clamp® Gaskets could fail for
of reasons causing leaks,
ıtrapment and ultimately
lowns. To the right are
easons why a gasket
nd what to look for
lling gaskets
ss line.

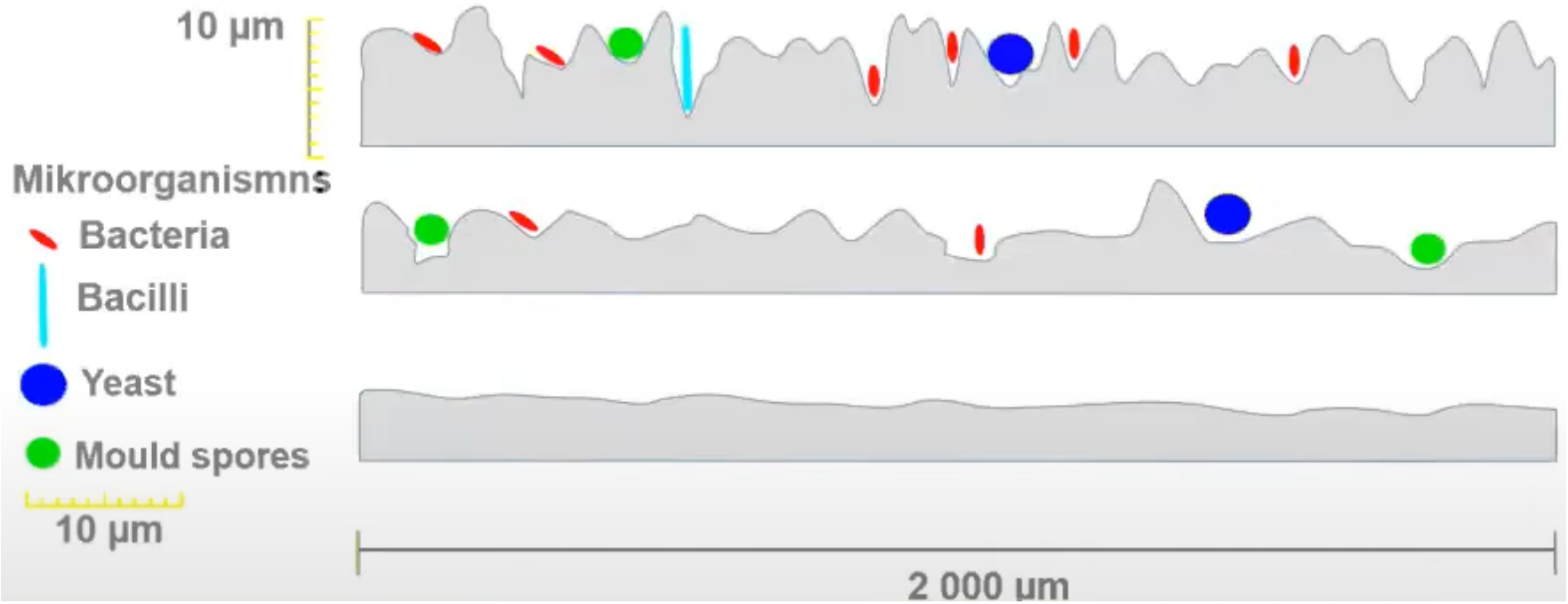


erfab.com

ECOLAB

MYTHS & MISTAKES

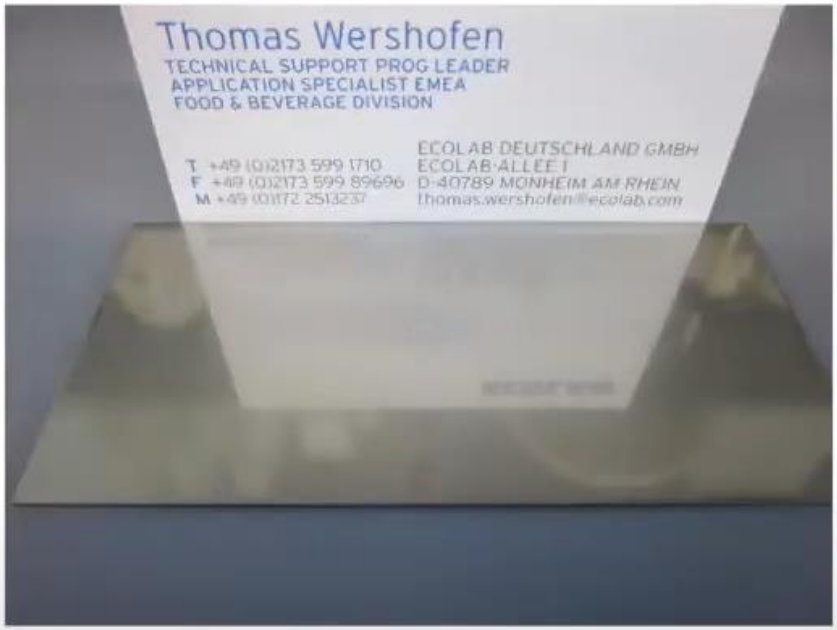
Smooth Surfaces - Stainless Steel Surface

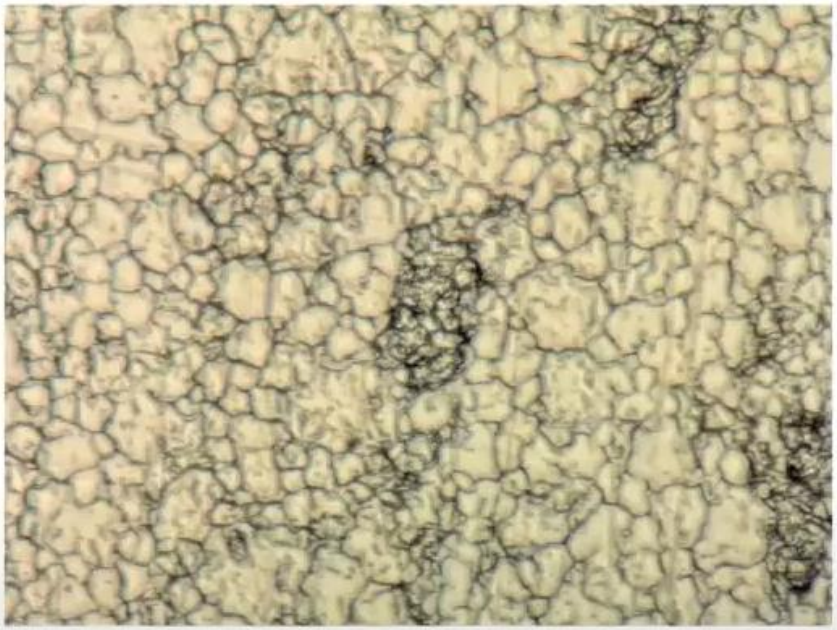


MYTHS & MISTAKES

Smooth Surfaces - Stainless Steel Surface

Photos of a stainless steel surface (R_z = 0,8)





MYTHS & MISTAKES

Smooth Surfaces - Stainless Steel Surface

2B Finish

- This is achieved by cold rolling, heat treating and pickling, along with the application of a light rolling at the end in order to achieve a smooth and reflective sheen. Considered the most widely used surface finish, 2B is the basis for most polished and brushed finishes. Most stainless-steel grades 304, 304L and 316L come in a standard 2B finish.

Pit Free Dairy (PFD)

- These types of finishes use an intense polishing method to eliminate any unseen pits, scratches or imperfections. Eliminating these imperfections early could also make the finished product easier to clean without the need to use harsh chemicals to eliminate the bacteria that develops.

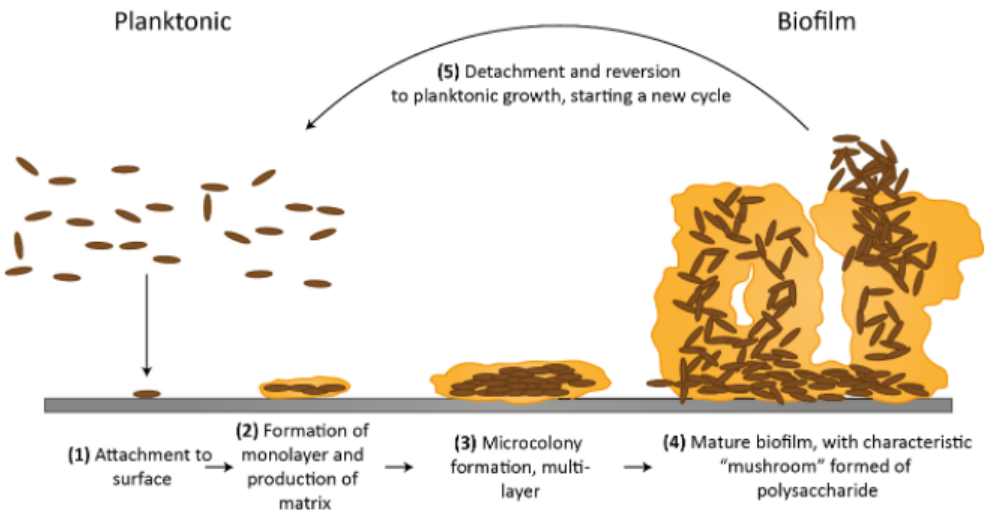
Sourced: https://www.ryerson.com/resource/the-gauge/three-layers-of-stainless-steel-polish#:~:text=Considered%20the%20most%20widely%20used,in%20a%20standard%202B%20finish.

MYTHS & MISTAKES

Chemistry & Micro Counts

I washed my system with a procedure that should have killed the biofilm, but my micro counts went up. How could this be?

- Plausible
  - An established biofilm can take numerous washes with the correct 4X4 process to completely remove an established biofilm.



Adapted from Vasudevan, 2014, J Microbiol Exp 1(3): 00014. DOI: 10.15406/jmen.2014.01.00014.


ECOLAB®


International Association for Food Protection®

Questions?

Questions should be submitted to the presenters via the **Questions section** at the right of the screen.

International Association for Food Protection® WEBINAR


International Association for Food Protection®

Contact Information

- dianew@montana.edu
- phyllis@posyglobal.com
- neil.bogart@ecolab.com
- jgrevepeterson@pssi.com

International Association for Food Protection® WEBINAR


International Association for Food Protection®

Join us for these upcoming webinars:

June 9 Low Water Activity Food Safety Series Part 4: Grain Based Foods and Ingredients

June 29 Connecting Processing Systems to Optimize Productivity and Reduce Waste While Achieving Higher Compliance

International Association for Food Protection® WEBINAR


International Association for Food Protection®

This webinar is being recorded and will be available for access by **IAFP members** at www.foodprotection.org within one week.

Not a Member? We encourage you to join today.
For more information go to:
www.FoodProtection.org/membership/

All **IAFP webinars** are supported by the IAFP Foundation
with no charge to participants.

Please consider making a donation to the **IAFP Foundation**
so we can continue to provide quality information to food safety professionals.

IAFP FOUNDATION

International Association for Food Protection® WEBINAR