Agenda: Day 1
Wednesday, June 25, 2008

9:00-9:30 Breakfast, Greetings, and Introductions
Location: HUCE (Harvard University Center for the Environment) (24 Oxford St., 3rd floor, Rm. 310)

9:30-10:00 Brainstorming Session + Concept Maps
Facilitators: Dr. Christy Herren and Dr. Dawn Hower

"What are microbes?"
"Why should anyone care?"
“What have you taught in your classes about microbial sciences?”

10:00-10:45 Lecture #1 Prof. Roberto Kolter
Title: "Biofilm: City of Microbes"

10:45-11:00 Break

11:00-11:15 Lecture #2 Prof. Colleen Cavanaugh
Title: “Dancing in the Dark: Chemosynthesis and Symbiosis at Deep-Sea Vents”

12:00-1:15 Lunch (provided at Center for Environment)
Special Lunch Lecture by Prof. Woody Hastings
Title: “How And Why Luminescent Bacteria Emit Light, And Why They Sometimes Do Not.”

1:15-1:30 Break and Transition to Biological Laboratories (Biolabs)
(16 Divinity Avenue, Biolabs Basement Level Lab, Rm B109)

1:30-4:45 Hands-On, Inquiry-Based Lab #1 Dr. Josh Blodgett
Title: “Tools of the Trade in Microbiology”
Including inoculations, sterile technique, and isolating bacteria using plate cultures and enrichment media. Specific topics include investigating the soil microbes, E. coli, Photobacterium, and other “funky bugs”. Special tour to see environmental staining and epifluorescent counts in soil and seawater.

4:45-5:00 First Day Evaluations/Feedback
Agenda: Day 2
Thursday, June 26, 08

9:00-9:30  Breakfast (Recap of Day 1 and Concept Maps)

9:30-10:00  Brainstorming Session + Concept Maps
Facilitators: Dr. Christy Herren and Dr. Dawn Hower

"How can we put more (some?) microbial science into the classrooms?"
"What do Science Teachers need from Scientists?"
"What do Scientists need from Science Teachers?"

10:00-10:45  Lecture #3  Prof. Peter Girguis
Title: "Malodorous Muck, Methane, Microbes and You: Why You Should Care About Dirt!"

10:45-11:00 Break

11:00-11:45  Lecture #4  Prof. Ann Pearson
Title: “The Third Domain of Life: When Archean Extremists Turn Ordinary”

12:00-1:00  Lunch (provided at Center for Environment)

1:00-1:30 Break and Transition to Biolabs (16 Divinity St., Basement Level)

1:30-5:00  Hands-On, Inquiry-Based Lab #2
Title: “Microbes and Biogeochemical Cycles: The Winogradsky Column”

part A: Analysis by Phenotype  Dr. Helen White
part B: Analysis by Genotype  Dr. Dawn Hower

Topics include creating, testing, and analyzing Winogradsky columns, examination of microbial fuel cells, and how to genetically probe unculturable species (DNA extractions, PCR, 16S rRNA, BLASTing genomic database searches). Special tour to see microbial fuel cells in action, and a working “microbial cold room” incubating deep sea sediments.

4:45-5:00 Second Day Evaluations/Feedback

5:00 – 5:30 Clean-up of Lab and transition to Harvard Yard Walk

5:30  Stroll through “The Yard” and dinner at John Harvard’s Pub in Harvard Square
Agenda: Day 3  
Friday, June 27, 2008

** Note Location Change for Morning Lectures: Haller Hall, Rm 102, 24 Oxford St) **

9:00-9:30  Breakfast (Recap of Day 2 and Regroup)

9:30-10:00  Brainstorming Session + Concept Maps  
Facilitators: Dr. Christy Herren and Dr. Dawn Hower

"What have you learned here that could be turned into a lesson plan?"
"You have 2 minutes to teach someone the most crucial lessons about microbes…go!

10:00-10:45  Lecture #6  
Ben Wolfe, PhD Student  
Title: "Fungi: Invasion of the Death Caps"

10:45-11:00  Break

11:00-11:45  Lecture #5  
Dr. Celeste Peterson (MIT)
Title: “Bacterial Biogeography and Assemblages in the Northern Pitcher Plant”

12:00-1:00  Lunch  
(Special Activity: Fungal Bingo with Prof. Anne Pringle)

1:00-1:30  Break and Transition to Biolabs (16 Divinity St., Basement Level)

1:30-5:00  Hands-On, Inquiry-Based Lab #3  
Ben Wolfe, PhD Student  
Title: “Exploring the Diversity of Symbiotic Microbes and their Hosts”

4:45-5:00  Third Day Evaluations/Feedback

5:00 – 5:15  Transition back to HUCE, 24 Oxford St.

5:30 pm  Closing Dinner (HUCE, 24 Oxford St.)

Last brainstorming session about future collaborations, final evaluations, and awarding of professional development points certificates
Microbial Sciences Initiative (MSI) at Harvard

WHO ARE WE?

MISSION STATEMENT:

The Microbial Sciences Initiative (MSI) at Harvard is an interdisciplinary science program aimed at a comprehensive understanding of the richest biological reservoir of the planet, the microbial world. Microbes are ubiquitous and have an impact on every aspect of our existence. Yet, their intrinsic invisibility has meant that they have remained largely unknown, their effects and enormous potential often unrecognized. The recent realization of the vastness of microbial diversity and the genomics revolution have propelled the microbial sciences into an exciting new era of investigation.

MSI is playing a leadership role in this emerging area by creating an organizational focal point for microbial studies with strong links to already existing science departments at Harvard. MSI encourages broad interactions among microbial scientists across the Boston area and also connects work on microbial sciences to ongoing work in related areas including molecular biology, biogeochemistry, oceanography, and environmental engineering. In addition, MSI aids in the recruitment of new faculty in the Faculty of Arts and Sciences and helps build bridges with microbial scientists at the Harvard Medical School and the Harvard School of Public Health. MSI has resources to support a variety of programs that encourage research interactions, including postdoctoral fellowships, undergraduate fellowships for summer research, visiting professorship, teacher professional development, seminars and a yearly symposium.
Workshop Lecturers

Colleen Cavanaugh:
Professor, Organismic and Evolutionary Biology Dept.,
Harvard University

Research Interests:
Symbioses of bacteria in marine invertebrates from deep-sea hydrothermal vents, methane seeps, and coastal reducing sediment. Specific emphasis on characterization of metabolic and genetic capabilities of symbionts, evolutionary relationships with free-living bacteria, and co-evolution of host and symbiont.

Website: http://www.oeb.harvard.edu/faculty/cavanaugh/
Contact: cavanaugh@fas.harvard.edu

Peter Girguis:
Professor, Organismic and Evolutionary Biology Dept.,
Harvard University

Research Interests:
Physiology and biochemistry of deep sea microorganisms, with an emphasis on carbon and nitrogen metabolism, to better understand their role in mediating local and global biogeochemical cycles. Also, the physiological relationships (such as nutrient exchange and immune responses) between microbes and animals in natural systems or laboratory simulations; special interests: microbial fuel cells, alternative energy development in third world countries.

Website: http://www.oeb.harvard.edu/faculty/girguis/
Contact: pgirguis@oeb.harvard.edu

Roberto Kolter:
Professor, Microbiology and Molecular Genetics, Harvard Medical School

Research Interests:
biofilm physiology, interspecies interactions, and microbial ecology and evolution; projects include: Microbial roles in regulating climate, Interspecies Interactions, Bacillus subtilis spatial organization and genome diversity

Website: http://gasp.med.harvard.edu/
Contact: rkolter@hms.harvard.edu
Ann Pearson:
Professor, Earth and Planetary Sciences Dept., Harvard University

Research Interests:
Ancient and modern Earth conditions; Microbial pathways of carbon fixation, lipid distributions in marine sediments, or the oxygen requirements of individual enzymes, Goal: to understand how, what, and why organisms leave particular chemical signals in the geologic record.

Website: http://www.eps.harvard.edu/people/faculty/pearsonlab
Contact: pearson@eps.harvard.edu

Celeste Peterson:
Postdoctoral Associate, Massachusetts Institute of Technology
Former Microbial Sciences Initiative Postdoctoral Fellow at Harvard University

Research Interests:
Microbial ecology- studying biogeography and community ecology in the model ecosystem Sarracenia purpurea (pitcher plant) to understand processes generating and maintaining microbial diversity.

Website: http://www.msi.harvard.edu/cpeterson.html
Contact: cnpeterso@gmail.com

Ben Wolfe: PhD Student (3rd year) in Organismic and Evolutionary Biology Dept., Harvard University

Research Interests:
I am interested in the ecology and evolution of symbiotic interactions between species. I am currently working with mushroom-forming fungi in the genus Amanita. These fungi form symbioses with the roots of woody plant species providing soil nutrients in return for carbon from the host plant. Using phylogenetic, stable isotope and functional genomic tools, I am examining how the evolution of symbiosis has played a role in the diversification of this group of fungi. I am also broadly interested in the diversity and function of soil microbial communities.

Website: http://www.oeb.harvard.edu/faculty/pringle/Ben.php
Contact: bewolfe@fas.harvard.edu
Woody Hastings:
Professor, Molecular and Cellular Biology Dept., Harvard University

Research Interests:
Biochemical mechanism of bioluminescence and the cellular and molecular mechanism of the circadian clock, Quorum sensing of bacteria on a global scale, luciferase genes in seven dinoflagellate species.

Website: http://www.mcb.harvard.edu/hastings/dino.html
Contact: hastings@fas.harvard.edu

Laboratory Experience Leaders

Josh Blodgett:
Microbial Sciences Initiative Postdoctoral Research Fellow, Biological Chemical and Molecular Pharmacology Dept., Harvard Medical School

Research Interests:
Communication between diverse groups of microorganisms in their natural microcosms, for example: bacterial interactions mediated by novel small metabolites that may have roles in intercellular communication or antibiosis; roles of ‘cryptic’ gene clusters found in the genomes of various bacteria; bacterial natural product that is commercially utilized as an herbicides.

Website: http://www.msi.harvard.edu/joshblodgett.html
Contact: joshua_blodgett@hms.harvard.edu

Helen White:
Microbial Sciences Initiative Postdoctoral Research Fellow, Organismic and Evolutionary Biology Dept., Harvard University

Research Interests:
Uncultivable microbes; developing ways to harness energy from microbes that perform extracellular electron transfer (EET); microbial metabolism involving interactions with solid materials via extracellular electron transfer (EET), which plays a key role in environments where diffusion of dissolved ions and volatile compounds is limited, e.g. biofilms, marine sediments or the subsurface, or in microbial fuel cells (MFC).

Website: http://www.msi.harvard.edu/helenwhite.html
Contact: hwhite@oeb.harvard.edu
**Ben Wolfe:**
PhD Candidate in Harvard Graduate School, Organismic and Evolutionary Biology Dept., Harvard University

**Research Interests:**
I am interested in the ecology and evolution of symbiotic interactions between species. I am currently working with mushroom-forming fungi in the genus Amanita. These fungi form symbioses with the roots of woody plant species providing soil nutrients in return for carbon from the host plant. Using phylogenetic, stable isotope and functional genomic tools, I am examining how the evolution of symbiosis has played a role in the diversification of this group of fungi. I am also broadly interested in the diversity and function of soil microbial communities.

Website: [http://www.oeb.harvard.edu/faculty/pringle/Ben.php](http://www.oeb.harvard.edu/faculty/pringle/Ben.php)
Contact: bewolfe@gmail.com

**Workshop Coordinators**

**Christy Herren:**
Program Coordinator, Harvard Microbial Sciences Initiative
Harvard University

**Research Interests:**
Bioluminescence, biological oceanography of pelagic and coastal regions, plankton ecology, multimedia learning resources, facilitating communication between educators and scientists, integrating new technology into teaching.

Website: [http://www.msi.harvard.edu/](http://www.msi.harvard.edu/)
Contact: herren@fas.harvard.edu

**Dawn Hower:**
Workshop Coordinator, Harvard Microbial Sciences Initiative and
Harvard University

**Research Interests:**
Oral microbiology including chemotaxis of spirochetes in dental cavities, university and college-level education, integration of new science and technology into education curriculum.

Contact: hower@fas.harvard.edu
Instructor Participants

Susan Braun  
State College Area High School  
650 Westerly Parkway  
State College, PA 16801  
(814)272-8590 voice mail  
(814)231-5020 main office  
E-mail: sjb30@scasd.org

Michael J. Clinchot  
Eighth Grade Science Teacher  
Boston Public Schools  
Edwards Middle School  
28 Walker Street  
Boston, MA 02129  
617-635-8516  
E-mail: mclinchot2@boston.k12.ma.us

Carolyn S. Davis  
Crossland High School  
6901 Temple Hill Road  
Temple Hills, MD 20748  
301-449-4800  
E-mail: mtshmaat@aol.com

Joyce Gleason  
Educational Consultant  
Florida Gulf Coast University,  
Ft. Myers, FL  
E-mail: joycegle@earthlink.net

Sheila M. Krotz  
Medical Biology, Anatomy & Physiology  
Professional Development Coordinator  
MEDICS Advisor  
San Ysidro High School  
San Diego, CA  
http://www.schoolnotes.com/02322/aebs/hepley.html  
E-mail: PositivelImpact@cox.net

Lauren Nelson  
North Smithfield High School  
412 Greenville Rd.,  
North Smithfield, RI 02896  
(401) 766-2500 mailbox 770  
E-mail: laurennelson5@gmail.com

Michael Romano  
Biology Teacher  
Acton-Boxborough Regional High School  
E-mail: mromano@mail.ab.mec.edu

Beth-Ann M. Shepley  
Biology Instructor  
Avon Middle-High School  
285 West Main St.  
Avon, MA 02322  
508-583-4822  
E-mail: bashepley@avon.k12.ma.us

Krishna Millsapp