

Water Microbiology Conference 2015
University of North Carolina at Chapel Hill
May 18-21
Side Event Schedule

Monday, May 18

	Redbud	Windflower	Bellflower	Dogwood
8:30 - 10:00am	Coliphage as Fecal Indicator Viruses in Recreational Water and Shellfish (Session 1) <i>Convened by University of North Carolina at Chapel Hill's Institute of Marine Sciences and the Department of Environmental Sciences and Engineering</i>		Climate Change and Diarrheal Disease <i>Convened by the University of Connecticut and Water Institute at UNC</i>	
Break 10:00-10:30am				
10:30a-12:00p	(continued)		(continued)	
Lunch 12:00-1:00pm				
1:00-2:30p	Coliphage as Fecal Indicator Viruses in Recreational Water and Shellfish (Session 2) <i>Convened by University of North Carolina at Chapel Hill's Institute of Marine Sciences and the Department of Environmental Sciences and Engineering</i>	Confidence in Data Integrity through Pipetting Technique and Training <i>Convened by Artel</i>	Writing a Scientific Paper: a boot camp for the writing process <i>Convened by Georgia State University</i>	
Break 2:30-3:00pm				
3:00-4:30p	(continued)		(continued)	

Tuesday, May 19

	Redbud	Windflower	Bellflower	Dogwood
8:30 - 10:00am	Disinfection of Reuse Water, Wastewater and Biosolids - Established Methods and Emerging Trends in Pathogen Inactivation <i>Convened by WEF Disinfection and Public Health Committee</i>		Pathogenic Environmental Mycobacteria: Detection, Sources, Health Effects and Economic Impacts <i>Convened by US Environmental Protection Agency</i>	How to Test, Teach and Treat Water in Rural Areas of Developing Countries to Eliminate Waterborne Disease <i>Convened by International Water and Health Alliances</i>
Break 10:00-10:30am				
10:30a-12:00p		Confidence in Data Integrity through Pipetting Technique and Training <i>Convened by Artel</i>	(continued)	(continued)
Lunch 12:00-1:00pm				

Water Microbiology Conference 2015
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Thursday, May 21

Redbud

8:30-9:30am	Emerging Pathogens in WWTPS <i>Convened by University of North Carolina at Chapel Hill</i>
Break 9:30-11:00am	
11:00am-12:00pm	(continued)
Lunch 12:00-1:00pm	
1:00-2:30pm	(continued)
Break 2:30-3:00pm	
3:00-4:30pm	(continued)

Monday, May 18

Coliphage as Fecal Indicator Viruses in Recreational Water and Shellfish, Session 1

Convened by the University of North Carolina at Chapel Hill's Institute of Marine Sciences and the Department of Environmental Sciences and Engineering

Session format: Training or Learning Workshop

Session output: Other

Room: Redbud

Session: Monday AM

Contact: Rachel Noble

Human pathogenic enteric viruses such as adenovirus, enterovirus, and norovirus, are prominently found in human sewage, and have been identified as important causative agents of gastroenteritis in humans from exposure to contaminated recreational waters and consumption of contaminated shellfish. Human pathogenic enteric viruses have very low infectious doses (as low as 1-10 virus particles), are highly transmissible, and have biochemical characteristics that permit them to persist in coastal receiving waters and shellfish, making these viral pathogens a serious concern. Previous work has suggested that currently utilized fecal indicator bacteria (FIB), such as *E. coli* and *Enterococcus*, do not adequately predict the presence of human viral pathogens in receiving waters that are contaminated with human sewage, meaning FIB are ineffectual proxies for pathogenic viruses. To date, methodological limitations prevent the desired multiple target viral pathogen analysis that could provide vital information for controlling specific viral pathogens of concern. A range of issues prevent human viral pathogens from being easily and directly quantified in sewage effluent, stormwater, and coastal receiving waters. Coliphage (bacteriophage that infect *E. coli* bacteria) have been previously cited as having potential to be used as fecal indicator viruses (FIV). Coliphage benefit from being quantifiable in a range of water types, and specific subgroups of coliphage (e.g. F+ coliphage) have been identified as having significant relationships to human health outcomes in recent epidemiological studies conducted in Southern California. Based upon the previously raised issues, federal agencies and groups including USEPA, FDA, and ISSC have highlighted possible routes forward to include coliphage in water quality and shellfish harvesting water quality management plans, including the possible development of new coliphage-based criteria for recreational waters, and new regulations regarding shellfish harvesting water closure areas based upon coliphage. This side event is being convened on the topic to accomplish the following objectives:

- 1) Provide an overview of current activities of federal agencies on the topic of coliphage and coliphage related water quality management strategies,
- 2) Provide a state of the science review, covering a range of topics of international interest on coliphage, and human enteric viral pathogens,
- 3) Identify, using a structured, prioritized, and facilitated approach, the existing data gaps to implementing water quality management strategies,
- 4) Identify short-term and long-term strategies to satisfy data gaps.

Coliphage as Fecal Indicator Viruses in Recreational Water and Shellfish, Session 2

Convened by the University of North Carolina at Chapel Hill's Institute of Marine Sciences and the Department of Environmental Sciences and Engineering

Session format: Training or Learning Workshop

Session output: Other

Room: Redbud

Session: Monday PM

Contact: Rachel Noble, Mark Sobsey, and Jill Stewart

Human pathogenic enteric viruses such as adenovirus, enterovirus, and norovirus, are prominently found in human sewage, and have been identified as important causative agents of gastroenteritis in humans from exposure to contaminated recreational waters and consumption of contaminated shellfish. Human pathogenic enteric viruses have very low infectious doses (as low as 1-10 virus particles), are highly transmissible, and have biochemical characteristics that permit them to persist in coastal receiving waters and shellfish, making these viral pathogens a serious concern. Previous work has suggested that currently utilized fecal indicator bacteria (FIB), such as *E. coli* and *Enterococcus*, do not adequately predict the presence of human viral pathogens in receiving waters that are contaminated with human sewage, meaning FIB are ineffectual proxies for pathogenic viruses. To date, methodological limitations prevent the desired multiple target viral pathogen analysis that could provide vital information for controlling specific viral pathogens of concern. A range of issues prevent human viral pathogens from being easily and directly quantified in sewage effluent, stormwater, and coastal receiving waters. Coliphage (bacteriophage that infect *E. coli* bacteria) have been previously cited as having potential to be used as fecal indicator viruses (FIV). Coliphage benefit from being quantifiable in a range of water types, and specific subgroups of coliphage (e.g. F+ coliphage) have been identified as having significant relationships to human health outcomes in recent epidemiological studies conducted in Southern California. Based upon the previously raised issues, federal agencies and groups including USEPA, FDA, and ISSC have highlighted possible routes forward to include coliphage in water quality and shellfish harvesting water quality management plans, including the possible development of new coliphage-based criteria for recreational waters, and new regulations regarding shellfish harvesting water closure areas based upon coliphage. This side event is being convened on the topic to accomplish the following objectives:

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Climate Change and Diarrheal Disease

Convened by the University of Connecticut and the Water Institute at UNC

Session format: Education Presentations

Session output: Future Collaboration, Other

Room: Bellflower

Session: Monday AM

Contact: Jonathan Mellor and Kristen Downs

Recent estimates indicate that anthropogenic climate change may increase the relative risk of diarrhea by 22-29% by the end of the 21st century (Kolstad and Johansson, 2011). Despite this, little attention has been paid to this potential crisis in the WASH sector and there are major gaps in our understanding of the climate drivers of diarrhea incidence. Most studies conducted to date rely on correlations between weather and diarrheal disease cases and do not adequately address modifying factors, the underlying mechanisms or the complexity of the underlying science. The understanding of these mechanisms and can only be achieved by bringing together a broad range of scientists and practitioners from the climatological, epidemiological, microbiological, hydrological, social and engineering sciences.

Therefore, the University of Connecticut and the UNC Water Institute propose to host a side event at the 2015 Water Microbiology Conference covering the climate drivers of diarrheal disease. The outline of this proposed side event is as follows:

1. Pathogen Survival and Transport Under Different Climate Conditions
 - a. Epidemiological studies linking seasonal weather and diarrhea incidence.
 - b. Diarrheal pathogens' temperature and moisture dependence.
 - c. Persistence and transport of pathogens in the environment under different climate conditions.
2. Climate Impacts on Water Resources
 - a. Climate change model predictions for low and middle-income countries.
 - b. Seasonal variation of water quality in low and middle-income countries.
 - c. Systems approaches to study climate, water and health.

The aforementioned goals will be achieved through a combination of presentations, expert panels and breakout sessions.

Confidence in Data Integrity through Pipetting Technique and Training

Convened by Artel

Session format: Training or Learning Workshop

Session output: Proceedings

Room: Windflower

Session: Monday PM and Tuesday AM

Contact: Emily Avis

This one and a half hour training session provides a quick and easy way to gain knowledge on proper pipetting technique. In addition to learning how pipettes work and fail, the audience will be trained on how to standardize proper pipetting technique, and recognize ergonomic risk factors and sources of stress.

Participants will have the tools necessary to improve their pipetting skills, the knowledge to avoid the most common injuries associated with pipetting, and an understanding of the mechanics and performance characteristics of mechanical pipettes.

Measurable Learning Objectives:

- Examine Pipettes and Tip Designs
- Determine Effects of Design on Performance
- Identify Causes of Pipette Failure
- Diagnose Silent and Random Failures
- Know the Importance of Choosing the Correct Pipette Tip
- Recognize Ergonomic Risk Factors and Sources of Injuries from Pipetting
- Demonstrate Best Practices for Using Pipettes
- Discuss Proper Technique of Pipettes to Improve Accuracy & Precision

Registering for the session is suggested, but not required. It will allow us to plan for attendees. This can be done at <http://waterinstitute.unc.edu/watermicro/program/side-session-1/>

Writing a Scientific Paper: A Boot Camp for the Writing Process

Convened by Georgia State University

Session format: Training or Learning Workshop

Session output: Publishable Paper or Other Framework

Room: Bellflower

Session: Monday PM

Contact: Lisa M. Casanova

Writing up your work for publication can be one of a scientist's biggest challenges. Your career advancement, and the advancement of your field, depends on getting your work into the peer-reviewed

literature. Do you have projects you need to write for publication? Does the writing process seem overwhelming and intimidating? Are you struggling with organization and presentation of your ideas? Do you have writing in progress that isn't coming together the way you want? Whether you are just starting research or ready to write, this interactive workshop will help you make progress on your paper with a framework for organizing your writing, and help you work toward the goal of a publishable paper by tackling all stages of your writing process:

- What are my writing goals?
- How do I focus part of a large project into a clearly defined manuscript?
- How is a scientific paper structured?
- How do I organize my paper around my main research goals?
- What goes in each section?
- How do I organize the presentation of data?
- Where do I start in writing a discussion?
- How do I place my work in a larger context?
- How does the process of publication work? What can I expect?

Bring your questions and manuscript writing projects at any stage. This workshop is highly interactive- we will work with your specific examples to help you organize and plan your writing. This workshop is for scientists at any stage of the writing process, whether you are just starting or in the process of writing a manuscript.

Tuesday, May 19

Disinfection of Reuse Water, Wastewater and Biosolids- Established Methods and Emerging Trends in Pathogen Inactivation

Convened by WEF Disinfection and Public Health Committee

Session format: Training or Learning Workshop
Session output: Future Collaboration

Room: Redbud
Session: Tuesday AM
Contact: Jay Swift

In this side session, the fundamentals of disinfection of reuse water, wastewater and biosolids will be discussed. The efficacy of pathogen and indicator inactivation for both established methods and emerging technologies will be presented.

Technologies discussed for wastewater and water reuse include chlorine-based disinfection, UV, ferrate, peracetic acid, ozone and pasteurization. For many years, chlorine-based disinfection dominated wastewater disinfection in the U.S. However, the use of UV systems has grown dramatically in the past 20 years, due to the development of higher-efficiency UV lamps, improvements in reactor design and automation, and the absence of byproducts in the disinfected effluent. Ferrate and peracetic acid are gaining interest in the wastewater industry, achieving disinfection with reduced formation of disinfection byproducts. Interest in ozone disinfection has also been increasing, due to advances in ozone generation systems and contactors, as well as ozone's strong reactivity and its potential to

improve water quality through removal of trace organics. Pasteurization is a new and emerging approach that has been used for disinfection of reuse water in California.

For biosolids, established technologies such as alkaline stabilization and heat pasteurization, along with new and emerging methods will be presented.

For each disinfection technology, current research regarding the factors impacting the efficacy of microbial inactivation will be discussed, including for established and emerging pathogens, including viruses, bacteria and protozoa. Multi-barrier approaches will also be discussed.

The session will end with a round table discussion to facilitate the identification of research needs and future collaboration.

Pathogenic Environmental Mycobacteria: Detection, Sources, Health Effects and Economic Impacts

Convened by US Environmental Protection Agency

Session format: Education Presentations

Session output: Future Collaboration, Other

Room: Bellflower

Session: Tuesday AM

Contact: Al Dufour

Mycobacterium avium complex is an environmental water-based pathogen that is posing an ever-increasing worldwide health risk to human populations. The purpose of this side event is to bring the latest scientific information regarding various aspects of environmental Mycobacterium avium complex to the attention of the scientific and policy-making communities. The goal is to stimulate the interest of meeting attendees in this research area by encouraging the exchange of scientific information and, furthermore, to promote new research interest in this pathogen.

How to Test, Teach and Treat Water in Rural Areas of Developing Countries to Eliminate Waterborne Disease

Convened by International Water and Health Alliances

Session format: Training or Learning Workshop

Session output: Future Collaboration

Room: Dogwood

Session: Tuesday AM

Contact: Robert Metcalf

WHO's estimate of the daily toll of waterborne diseases is >4,600,000 episodes of diarrhea and >2,000 deaths. The majority of these episodes and deaths are among people in extreme poverty who live in rural areas of developing countries and use unimproved, contaminated drinking water sources.

This workshop will cover practical approaches to water testing, community teaching and disinfection methods in low resource areas that communities can adopt to reduce the plague of waterborne diseases.

Two water testing methods will be covered: 1) the Portable Microbiology Laboratory (PML), a field kit that contains two tests widely used in the water and food industries to detect the fecal indicator *E. coli*. 2) The Aquagenx portable and self contained Compartment Bag Test (CBT) for *E. coli*. Workshop participants will perform these tests on water sources to obtain next day results that correlate with WHO disease risk guidelines.

Using the Friends of the Old (FOTO) project in Lower Nyakach, Kenya, as an example, a community teaching strategy will be presented that demystifies microbiology and clarifies the link between contaminated water and disease, replacing myths with science. Practical disinfection methods of liquid chlorine and solar water pasteurization used in the FOTO project will be covered.

Thursday, May 21

Emerging Pathogens in WWTPS

Convened by the University of North Carolina at Chapel Hill

Session format: Workshop
Session output: Proceedings

Room: Redbud
Session: Thursday PM
Contact: Jacqueline MacDonald Gibson

The past ten years have seen the rapid growth of new molecular methods that enable the identification and enumeration of pathogens and have the potential to help mine the 'dark matter' of microbial communities for new public health tools. However, in emergency disease outbreak settings these developments have had very little impact on water, sanitation and hygiene practice. The 2010 cholera outbreak in Haiti and the recent West Africa Ebola outbreak both demonstrated the knowledge gaps around dealing with pathogen-laden human feces. There is a critical need for rigorous and integrated analytical methods, decision support tools, and emergency preparedness protocols to help for water and wastewater engineers, public utilities, hospitals, health officials, and community leaders to be prepared for the possibility of such high-risk pathogens appearing in wastewater and to prevent potential exposures.

This workshop will produce first draft emergency preparedness protocols for managing the risks of pathogen transmission via fecal matter and wastewater in outbreak settings. Three protocols for managing fecal matter will be prepared: one for outbreak communities, the second for hospitals and other treatment centers, and the third for wastewater treatment plants.

The workshop will bring together participants from wastewater utilities, hospitals, public health agencies, and non-government organization personnel with experience in outbreak settings. In addition, participants will include infectious disease experts and experts in decision-making under emergency situations.

During the morning session of this full-day workshop, experts will present key topics relevant to emergency preparedness protocols for fecal waste management in outbreak settings. Then, participants will divide into three break-out groups focused on managing fecal matter in (1) outbreak communities, (2) hospitals and other treatment centers, and (3) wastewater treatment plants. Each group will write a first draft of an emergency preparedness protocol relevant to the particular setting. Subsequently, these drafts will be circulated among the groups for revision and expansion.