

**MME extends its gratitude to all the speakers, presenters, field trip leaders, exhibitors and contributors of services, bag contents, posters and door prizes:**

Dr. James A. Yoder, Vice President for Academic Programs and Dean, WHOI

Dr. Kate Madin, Curriculum Coordinator, Academic Programs Office, WHOI

Linda Amaral-Zettler, Ph.D., Associate Scientist, Marine Biological Laboratory

Stefan M. Sievert, Ph.D., Associate Scientist, WHOI

Krista Longnecker, PhD, Research Specialist, WHOI

Matthew Barton, Multimedia Technician, Graphics, WHOI

Hovey Clifford, Senior Engineering Assistant I, retired, WHOI

Kathy Patterson, Exhibit Center, WHOI

Nicole Scola, New England Aquarium, Boston, MA

The New Bedford Whaling Museum and New Bedford ECHO Project

Rob Reynolds, The Zephyr Education Foundation, Woods Hole

Provincetown Center for Coastal Studies

Mary Kay Taylor and Curtis Sarkin, Maritime Gloucester

Anne Smrcina, Stellwagen Bank National Marine Sanctuary

Sea Education Association, Woods Hole

Massachusetts Institute of Technology (MIT) Sea Grant, Cambridge, MA

Carole McCauley, Northeastern University Marine Science Center, Nahant

Roland Lamirande, *Chef Roland's Catering*, East Falmouth, MA

Erik Gura, *Pie in the Sky*, Woods Hole

Meg Tabacsko, Massachusetts Water Resources Authority

Jonathan Bird's Blue World, Jonathan Bird Productions, Oceanic Research Group, N. Reading

Grainger Pottery, Marion, MA

National Marine Life Center, Buzzards Bay, MA

Athlete's Corner, Swampscott, MA

Sandra Ryack-Bell, Museum Institute for Teaching Science

Coleen O'Connell, MS in Ecological Teaching & Learning, Lesley University

Author Bill Sargeant [http://www.aswh.org/BSargent\\_new.html](http://www.aswh.org/BSargent_new.html)



# Massachusetts Marine Educators

38<sup>th</sup> Annual Conference and Meeting  
at Woods Hole Oceanographic Institution

## Why Marine Microbes Matter



Saturday, April 12, 2014

Visit MME at [www.massmarineeducators.org](http://www.massmarineeducators.org)

## Welcome to the 38<sup>th</sup> MME Annual Meeting and Conference Hosted by the Woods Hole Oceanographic Institution!

Carolyn Sheild, MME Conference Chair

The many tasks of organizing this meeting were shared by individual members of the Board of Directors and MME members-at-large. We extend special thanks to Dr. Kate Madin and her colleagues in the Academic Programs Office at WHOI. MME members who wish to become active on committees or join the Board of Directors are invited to speak with a current Board member.

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Cover Photo: *Marine microbes*. Photo:  
Patterson, Amaral-Zettler and Edgcomb.

## Massachusetts Marine Educators Awards

### MME EDUCATOR OF THE YEAR

*For outstanding contributions to the education of students, teachers, and communities*

### JOSEPH BALSAMA SERVICE AWARD

*For outstanding assistance to MME and the Boston Harbor Educators Conference*

### NAP BUONAPARTE SERVICE AWARD

*For outstanding assistance and support to MME*

### MME AWARD OF DISTINCTION

*For their commitment to marine education by connecting thousands of kids to the ocean*

### CERTIFICATES OF APPRECIATION

*For their dedicated service and continued support to MME*

### JOHN PATRICK CROWLEY MEMORIAL TEACHER GRANTS

## Conference Exhibitors

New England Aquarium	Sea Education Association
Stellwagen Bank National Marine Sanctuary	Zephyr Education Foundation, Inc.
New Bedford Ocean Explorium	National Marine Life Center
Maritime Gloucester	NOAA Protected Species
National Marine Educators Association	Author Bill Sargent
Coastal Studies for Girls	Lesley Univ, MS in Ecological Teaching & Learning

## Save the Following Dates!

**Annual MME Marine Art Contest --Deadline: May 2**  
**2014 Boston Harbor Educators Conference, UMass/Boston -- September 27**  
**MME & NERACOOS Build-a-Drifter Workshop – May 10**  
[http://www.neracoos.org/drifters\\_May2014](http://www.neracoos.org/drifters_May2014)

## Conference Speakers

### **Linda Amaral Zettler – *Life in the “Plastisphere”: Microbial Communities on Plastic Marine Debris***

Plastic is now **the** most common form of man-made debris in the ocean and its accumulation is a topic of great public concern and increasing scientific interest. However, recent research shows that the overall amount of plastic in the North Atlantic Ocean is remarkably stable. *Where is all the plastic going?*

My presentation will reveal that the answer may lie within the "Plastisphere" and the ocean's "hidden majority" – the smallest forms of life in the ocean – marine microbes – bacteria and other single-cell organisms. Like the biosphere, the thin film of life around the surface of planet Earth, the "Plastisphere" represents a little world of life that exists on the surface of plastic particles. We use a combination of high-powered microscopy and state-of-the-art DNA sequencing to show that plastic marine debris is home to a diverse array of microscopic organisms that are distinct from the surrounding waters, as well as from natural substrates such as floating seaweeds – we are describing the “natural history” of an unnatural substrate.

### **Krista Longnecker, Ph.D. – *Microbial Lunch: Organic Carbon with a Touch of Salt***

Microorganisms play a key role in biogeochemical cycles. The quantity of carbon in microbial biomass equals the amount in terrestrial plants. Furthermore, in marine ecosystems, microorganisms are responsible for up to 60% of the carbon dioxide produced during the consumption of organic carbon. For these reasons, we turn to microorganisms during unexpected events such as oil spills in the hope that they will be able to remove oil from the environment. During my talk, I will address (1) how microorganisms utilize carbon sources, including oil, for carbon and energy, (2) address the diversity and activity of microorganisms in areas impacted by oil spills, (3) and assess how changes in microbial utilization of oil impacts higher trophic levels. Through these types of projects I seek to improve our understanding of the links between microorganisms and biogeochemical cycles.

### **Stefan M. Sievert, Ph.D. – *Shedding Light on Dark Life at Deep-Sea Vents***

Deep-sea hydrothermal vents, first discovered in 1977, are exemplary ecosystems where microbial chemosynthesis rather than photosynthesis is the primary source of organic carbon. Chemosynthetic microorganisms are at the nexus of these highly productive systems by effectively transferring the energy from the geothermal source to higher trophic levels, in the process supporting the abundant and enigmatic animal life in the complete absence of light. While this general view of the functioning of these ecosystems is well established, there are still major gaps in our understanding of the microbiology and biogeochemistry of these systems. Important questions in this regard are: (1) How much, at what rates, and where in the system is organic carbon being produced? (2) What are the dominant autotrophs, where do they reside, and what is the relative importance of free-swimming, biofilm-forming, and symbiotic microbes? (3) Which metabolic pathways are they using to conserve energy and to fix carbon? (4) How does community-wide gene expression in fluid and biofilm communities compare? and (5) How efficiently is the energy being utilized, transformed into biomass, and transferred to higher trophic levels? In particular, there is currently a notable lack of process-oriented studies that would allow an assessment of the larger role of these ecosystems in global biogeochemical cycles.

After summarizing current knowledge of the functioning of these truly fascinating ecosystems and presenting information about present and future studies, I will discuss recent efforts to engage the public and bring this research into the classroom.

## Agenda

- 8:00 am** New Member Reception at WHOI Ocean Science Exhibit Center
- 8:30 am** **Registration** in Redfield 204; sign up for afternoon options by 1 pm
- 9:00 am** **Welcome and Opening Remarks**  
Erin Hobbs, President, Massachusetts Marine Educators  
Dr. James A. Yoder, VP for Academic Programs and Dean, WHOI
- 9:15 am** **Speaker: Dr. Linda Amaral Zettler**, Associate Scientist, Josephine Bay Paul Center for Comparative Molecular Biology and Evolution, Marine Biological Laboratory  
*Life in the “Plastisphere”: Microbial Communities on Plastic Marine Debris*
- 10:15 am** **Presentation:** Massachusetts Marine Educators **Annual Awards**
- 10:30 am** **Break** with complimentary refreshments; explore the exhibits and WHOI Visitor’s Center
- 11:00 am** **Speaker: Dr. Krista Longnecker**, Research Specialist, Marine Chemistry and Geochemistry Department, WHOI  
*Microbial Lunch: Organic Carbon with a Touch of Salt*
- 12:00 pm** Massachusetts Marine Educators Annual **Business Meeting**
- 12:15 pm** **Lunch:** On your own or enjoy a cup of Roland’s Clam *chowdah!*
- 1:00 pm** **Speaker: Dr. Stefan M. Sievert**, Associate Scientist, Biology Department, WHOI  
*Shedding Light on Dark Life at Deep-Sea Vents*
- 2:00 pm** **Presentation of door prizes:** Goodies for teaching about the ocean!
- 2:45-4:15 pm** **Afternoon Workshops, Tours, and Field Trips:** See pages 4 and 5
- 4:30 pm** **Social Reception:** Sea Education Association, 171 Woods Hole Road, in the Madden Center. All are invited! SEA is on the left, after the set of lights, as you drive toward Falmouth; the Madden Center is at the top of the drive, and parking is nearby.

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## Afternoon Options 2:30-4:15 pm

Please sign up for programs and tours in Redfield 204 by 1:00 pm

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### Science Cruise with *The Zephyr Education Foundation, Inc.*

Cruise Vineyard Sound aboard the *R/V Minuteman*! Conduct oceanographic measurements and collect marine biological specimens, view the real-time underwater benthic video camera, help deploy and track a surface drifter; learn about research projects at the Woods Hole scientific institutions; and find out how you can bring your students on a Zephyr field trip that addresses the MA Science and Technology/Engineering Curriculum Frameworks. Dress warmly!

**Time:** 2:30 to 4:00 pm; the boat will leave the dock promptly at 2:45 pm  
**Presenters:** Rob Reynolds of *The Zephyr Education Foundation, Inc.*  
**Place:** Meet Rob in the Redfield lobby for a short walk to the *R/V Minuteman*, located at Dyer's Dock, across the street from Redfield  
**Limit:** 20  
**Cost:** \$10 per person (Thank you, Rob, for such a terrific opportunity!)

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### Workshop: Lesson Share

Come share a lesson about microbes (or other lessons of your choosing). This is your chance to collaborate, share your lesson ideas and hopefully walk away with a fresh new idea for your classroom. Bill Andrade from Swampscott Middle School will lead the group by sharing one of his skillfully developed, successfully tested and kid-approved lessons. Then it will open up to the group for open discussion. If you have copies of your lesson, GREAT!! If you don't have copies, but have a successful lesson plan that you can email later, that's great too! Everyone is welcome. Collaboration is encouraged and inspiration is guaranteed.

**Time:** 2:45 to 4:15 pm  
**Leader:** Bill Andrade  
**Place:** Meet Bill in the Redfield lobby  
**Limit:** 25

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## WHOI Dock Tour

Take an insider's tour of the Woods Hole Oceanographic Institution. View dockside oceanographic equipment, see possible submersible sighting with ongoing upgrades in the high bay, and be amazed by true stories about research at sea and on shore. Dress warmly, and bring a camera!



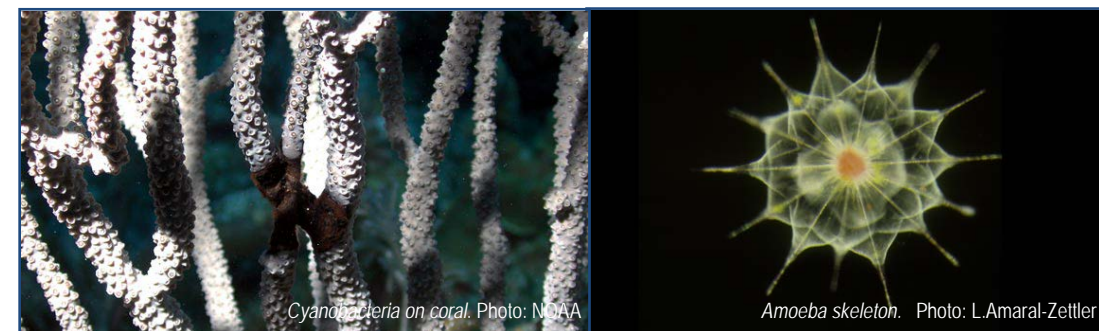
**Time:** 2:45 to 3:45 pm  
**Tour Guide:** Hovey Clifford, retired after a more than 30 year career at WHOI  
**Place:** Hovey will meet the group on the steps outside the Redfield building  
**Limit:** 20

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## Workshop: Marine Fossils for Elementary/Middle Schools

Using small seashells and plaster, cast your own 'fossil' shell in a paper cup. Learn how the layering of fossils teaches about Earth's constantly changing environmental conditions over long periods of time. Dozens of fascinating marine fossils will be on display, including teeth from giant sharks and reptiles, ancient whale bones, fossilized fishes, and shells, coral, and trilobites older than the first dinosaurs.

**Time:** 2:45 pm to 4:15 pm  
**Presenter:** Curtis Sarkin and Joel Rubin  
**Place:** Redfield 204  
**Limit:** 25





# Massachusetts Marine Educators 38th Annual Meeting and Conference

## *Why Marine Microbes Matter*

**Saturday, April 12<sup>th</sup>**

**8:30 am - 4:30 pm**

**Redfield Building at Woods Hole Oceanographic Institution**

### **Schedule**

<b>8:00 am</b>	<b>New Member Reception</b>
<b>8:30 am</b>	<b>Registration in Redfield 204</b>
<b>9:00 am</b>	<b>Welcome and Opening Remarks</b>
<b>9:15 am</b>	<b>Morning Speakers</b>
<b>12:00</b>	<b>Business Meeting and Awards</b>
<b>Lunch</b>	<b>Complimentary chowder will be served</b>
<b>1:00 pm</b>	<b>Afternoon Speaker</b>
<b>2:00 pm</b>	<b>Door Prizes</b>
<b>2:30-4:15 pm</b>	<b>Afternoon Workshops, Tours, and Field Trips</b>
<b>4:30 pm</b>	<b>Social Reception: Sea Education Association. All are invited!</b>

### **Featured Speakers**

- ❖ **Dr. Linda Amaral Zettler**, Associate Scientist/Associate Professor, Marine Biological Laboratory  
Research: Life in the "Plastisphere": Microbial Communities on Plastic Marine Debris
- ❖ **Dr. Krista Longnecker**, Research Specialist Marine Chemistry & Geochemistry, Woods Hole Oceanographic Institution  
Research: Microbial Lunch: Organic Carbon with a Touch of Salt
- ❖ **Dr. Stefan Sievert**, Associate Scientist, Biology Department, Woods Hole Oceanographic Institution  
Research: Shedding Light on Dark Life at Deep-Sea Vents

### **Afternoon Workshops**

- Science Cruise with The Zephyr Education Foundation Inc.
- WHOI Dock Tour with Hovey Clifford
- Lesson Share: Come prepared to share a lesson and receive lessons related to *Microbes*
- Marine Fossils for Elementary Teachers

### **Registration**

- Register online: <https://massmarineeducators.wufoo.com/forms/2014-woods-hole-conference/>
  - Early Bird Registration- \$60 by March 24, 2014
  - Regular Registration \$70 after March 24, 2014
  - Life Time Member \$40
  - Full Time Student \$45Registration includes a year membership to MME.
- Conference questions? contact Carolyn Sheild [csheild@rcn.com]

[www.massmarineeducators.org](http://www.massmarineeducators.org)