

# Partnership

Spring/Summer 2009 Issue: Volume 19, No. 2

## Letter from the Chair: Science and Inspiration

- Pat Harcourt

“Today, more than ever before, science holds the key to our survival as a planet and our security and prosperity as a nation. It's time we once again put science at the top of our agenda and work to restore America's place as the world leader in science and technology.” -- President Barack Obama

The times are filled with challenges for science and education, as they are for other sectors of society. Budget cuts, shrinking incomes, and fewer grant opportunities are coupled with a crucial need for high quality education, accurate information about the natural world, and innovative technologies to help solve problems. What's needed is a triple dose of inspiration - motivation, ideas, and a deep breath.

President Obama's support of science and his recognition that science literacy is a necessary precursor to innovation and technical advancements provides a great inspiration for teachers who now have an ally in a leadership position to provide a solid backup when making the case for supporting science education to administrators, parents, and communities. We can also draw a great deal of inspiration from children, who are natural scientists, and from the many professional scientists in our community whose enthusiasm and passion for science drives their investigations. WHSTEP can shine a spotlight on both of these inspirational groups by providing lessons, opportunities, and mini-grants that help teachers foster students' explorations, and by introducing teachers and community members to scientists through Safaris and our Annual and General meetings.

WHSTEP can provide inspiration in the form of ideas through our outreach efforts to schools and teachers in Bourne, Falmouth, and Mashpee. Our Registry of Outreach Volunteers is a useful starting point for teachers to find a local scientist, engineer, or technician who can provide information or data or make a personal appearance to enrich students' experiences. We regularly post announcements about opportunities, meetings, and even free materials on our email list serve. Our Science and Math Safaris inspire teachers with visits behind the scenes to see remotely operated vehicles, historic plants and samples, and even tanks full of the fish and invertebrates used in research studies.

The third type of inspiration, drawing a deep breath, represents the roles we all play in promoting science, math, engineering, and technology education in the community – it takes hard work. Each of us, teachers, scientists, parents, and colleagues, can help bring these topics into the classroom and build opportunities for scientists to make connections with schools, teachers, and students. WHSTEP needs people who will communicate about our programs, volunteer to participate, or suggest ideas for ways we can fulfill our mission. We appreciate your ideas, participation, and feedback, and we encourage everyone who is interested



*Tom Kleindinst, WHOI*  
John Bratton, USGS (right), Bob Heller and Bob Porto, Lawrence School, watch the Magic Planet projection system display of global ocean temperatures at the WHSTEP General Meeting in January.

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to talk with a member of the Executive Committee about ways to become more involved. One of the greatest benefits is that through WHSTEP you will become immersed in both the world of the classroom and the world of the lab.

Find out more about WHSTEP and join us – there's plenty of inspiration to go around!

## WHSTEP Teacher Tour: Behind the Scenes in Woods Hole

-Pat Harcourt

In January 2009, teachers from Bourne, Falmouth, and Mashpee had a chance to visit labs and facilities not normally open to the public. Thanks to the generosity of scientists in Woods Hole village, 14 teachers had close encounters with research projects and equipment in three very different areas of science. Recognizing the value of the experience for the teachers, the Upper Cape school systems granted permission for them to spend part of a region-wide professional development day acquiring first-hand knowledge and information.



*Kama Thielor*

WHOI/MIT graduate student Heather Beem describes batteries and other components of AUVs she is building in the Deep Submergence Lab of WHOI.

The teachers' first stop was at the lab of Dr. Hanumant Singh of Woods Hole Oceanographic Institution. Dr. Singh and Heather Beem, a WHOI/MIT Joint Program student in Applied Ocean Physics and Engineering, described some of the work under way at the lab, where research projects include imaging and underwater robotics. They reviewed the 3 different types of underwater vehicles: manned submersibles, including the well-known ALVIN; Remotely Operated Vehicles such as JASON which remain connected to a ship through a tether and can communicate continuously via cable connection; and Autonomous Underwater Vehicles which are programmed to operate independently.

Ms. Beem introduced the group to the AUVs she was working on, a group of three related vehicles which will be used in different oceans for research projects as varied as exploring a deep sea floor trench and studying fish associated with corals. The teachers had many questions about the technology and were impressed with the ingenious and practical solutions to problems such as

providing a power supply for long-term deployments and acquiring images in the dark, particle-filled waters of the deep ocean.

The teachers' next stop was at the Josephine Bay Paul Center for Comparative Molecular Biology and Evolution at the Marine Biological Laboratory. The teachers were welcomed to the Keck Facility, which has equipment for high-volume DNA template production and sequencing, by Dr. Hilary Morrison, whose research interests include molecular and genomic evolution in eukaryotes, and who regularly supports science education as a volunteer in Falmouth Public Schools. The teachers found the capacity of the lab's equipment to process samples most impressive, as Dr. Morrison explained that the sequencer could generate information on 100 million DNA bases per day. The biology teachers in the group were especially interested in the sequencer, and enjoyed learning how equipment in the lab is used in many studies of microbial diversity in marine and other sites.



*Kama Thielor*

As teachers look on, Hilary Morrison (far right) describes the DNA sequencing capabilities of the Keck Genetics Facility at MBL.

The final stop for the teachers was at the Marine Resource Center of the Marine Biological Laboratory. Ed Enos, Superintendent of the Marine Resources Division at MBL, guided the teachers through the maze of pipes and tanks full of fish or bivalves, and provided an expert and engaging commentary on the creatures, their uses as model systems for research, and the importance of giving students opportunities to observe and work with live organisms. Mr. Enos pointed out that Woods Hole is an ideal location for collecting marine creatures since there is easy access to northern as well as southern species. The teachers enjoyed observing the spiny dogfish, horseshoe crabs, lobsters, and

**(continued)** sea urchins used for different research projects, and were pleased to learn that Mr. Enos could help them arrange a class visit to the facility for their students.

WHSTEP would like to extend warm thanks to Woods Hole Oceanographic Institution and Marine Biological Laboratory and especially to Hanu Singh, Heather Beem, Hilary Morrison, and Ed Enos for providing the teachers with such engaging experiences and useful information.



*Kama Thielor*

Ed Enos, MBL Marine Resources Center, Lee Horner, K. C. Coombs School, and Pat Harcourt, Waquoit Bay Reserve, take a look at some of the MRC inhabitants.

#### **On-line Resources:**

##### **Deep Submergence Lab**

<http://www.whoi.edu/groups/DSL/>

Dr. Singh recommended the Dive and Discover website to teachers as a useful and fun way for students to learn about this type of technology:

<http://www.divediscover.whoi.edu/>

##### **Josephine Bay Paul Center, MBL**

<http://jbpc.mbl.edu/facilities-keck.html>

Dr. Morrison referred teachers to the Census of Marine Life <http://www.coml.org/> and the International Census of Marine Microbes <http://icomm.mbl.edu/> as two websites that would be helpful to introduce students to the type of work that relies on information from the Keck Facility.

The **Marine Resource Center** web site

<http://www.mbl.edu/mrc/index.html> is full of information and resources for students and teachers.

The MRC can also supply marine organisms for educational aquaria, care and feeding instructions, and a Teacher's Guide:

<http://www.mbl.edu/mrc/outreach/aquaria.html>

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## **USGS Hosts WHSTEP General Meeting**

- Debbie Scanlon

The WHSTEP General Meeting on January 28, 2009 featured Beth Schwarzman, local author and earth-science educator, who gave a presentation "The Geology of Home, and Why You Should Care." The prediction of three to six inches of snow that day left WHSTEP organizers wondering whether to postpone the meeting, but a hardy audience of about 30 teachers, scientists, and community members attended as the snow turned into slush.

Ms. Schwarzman's talk, held at the U. S. Geological Survey's Gosnold Lab on the Quissett Campus, was fascinating and saw many audience members nodding their heads in "aha!" moments as they heard Ms. Schwarzman explain geological features in their backyards. Local features such as the presence or absence of boulders, and the types of trees that grow in different environments provide clues as to how our glacially-shaped landscape formed and changed over time. Beth also provided a hands-on map activity about Upper Cape geology that used these clues to draw a geologic map of the Upper Cape.

Chris Polloni, outreach and communications coordinator of USGS Woods Hole Science Center, welcomed the group to the facility's new conference room. USGS liaison to WHSTEP Nancy Soderberg displayed information about USGS educational resources.

For more information about our local geology, see Beth Schwarzman's book, [The Nature of Cape Cod](#), USGS fact sheet "Geology of the Woods Hole Area, MA - The Story Behind the Landscape," by Deborah Hutchinson and Beth Schwarzman (<http://pubs.usgs.gov/fs/fs066-01/fs066-01.pdf>) and "The Geologic History of Cape Cod", by Robert N. Oldale (<http://pubs.usgs.gov/gip/capecod/>).

## WHSTEP Science Safari to Data Library and Herbarium

-Pat Harcourt

Teachers who attended the WHSTEP Science Safari on March 25, 2009 had a chance to go where few have gone before, deep into the recesses of climate-controlled rooms on the lower floor of McLean Lab on the Quissett Campus of Woods Hole Oceanographic Institution. This Safari brought teachers into the Data Library and Archives at WHOI, where they were welcomed by manager Lisa Raymond. Ms. Raymond explained that the Archives preserve administrative records and personal papers with individual scientific work of WHOI scientists from the time of the Institution's founding in 1930.

The teachers were invited to view the facility, led by Archivist Dave Sherman, who showed them rooms full of historic records and irreplaceable artifacts from decades of oceanographic research cruises. The teachers saw journals, samples, and photos preserved from cruises all over the world, including a section of the mast and the original medicine chest from the sailing research vessel Atlantis and an extensive collection of nautical charts and topographic maps used by scientists. The data library and Archives have many resource materials available via their website

[http://www.mblwhoilibrary.org/archives/dla\\_ref.html](http://www.mblwhoilibrary.org/archives/dla_ref.html)

Pam Polloni then brought the group into another room of wonders, the MBL/WHOI Herbarium, where more than 9,000 specimens of plants and algae from Cape Cod and the Islands are stored and preserved.

Ms. Polloni selected several samples from the collection, showing the group examples of closely related plants that had to



Courtesy MBL/WHOI Herbarium  
*Rhodomela* sp., an example of a scanned sample available on the Digital Herbarium website.

be carefully keyed out, species that are rare in the region, and familiar common plants, including some collected as long ago as 1873.

Each specimen has a detailed catalogue entry and each is carefully preserved, sometimes with blossoms or seeds. One important role of the specimens in the herbarium is to provide vouchers, or a verifiable record of the occurrence of a species in the area. The group was delighted to find that the collection is being digitized and is accessible on line, making it practical for the teachers and their students to use from school or home. The Digital Herbarium, with high resolution images and detailed information about each sample can be found at <http://mercury.mbl.edu/herbarium/>.



Kama Thielier  
Pam Polloni, curator of the MBL/WHOI Herbarium, displays some of the herbarium's collection to teachers during the March science safari.

WHSTEP would like to extend many thanks and much appreciation to Lisa Raymond, Dave Sherman, and Pam Polloni for opening their doors and sharing these treasure troves with teachers.

## Science Fair Season

- Kama Thieler

As the winter break/holiday ends, it is time for another busy season to begin— Science Fair season. Teachers, administrators, and community members organize the fairs. Students, in consultation with parents, teachers and mentors, work on topics ranging from chewing gum taste preferences to genetics. The local scientific community contributes mentors, judges, prize donations, and exhibits.

For 12 years, WHSTEP has organized a science project mentoring program at the Lawrence School in Falmouth. Members of the WHSTEP scientific community volunteer their time to meet with 7<sup>th</sup> and 8<sup>th</sup> grade students and help them design and refine their science projects. Students meet with the volunteer mentors one-on-one for 15 to 25 minutes during their science class periods. This year, mentoring took place in late January.

WHSTEP thanks the following volunteers for taking their time to help the students at the Lawrence School:

**Michele Bahr, J.C. Weber, Liese Siemann, Sam Kelsey, Marshall Otter, Mary Anne Alliegro, Anne Thessen and Grant Harris (MBL); Bill Waite, Neil Ganju, Claudia Flores and Brian Buczkowski (USGS), Gary Shepherd (NMFS); Garrett Leahy, Melissa Patrician, Nancy Copley, Mindy Richlen, Oliver Zafrirou and Jessica Bethuysen (WHOD); Jared Stabach and Paul Lefebre (WHRC); Pat Harcourt (WBNERR); Tracey Crago, Meredith Axon, David McKeirnan, Charles Bacon and Alan Alai (VIPS); Molly Cornell, Beth Schwarzman, Gary Schwarzman, Jim Newman and Deb Coulombe (community).**

This year, WHSTEP arranged for exhibits at the Falmouth District Science Fair showcasing local research, educational opportunities and careers in science. The following science institutions participated: Woods Hole Oceanographic Institution, Sea Education Association, Marine Biological Laboratory, Woods Hole Research Center and USGS Woods Hole Science Center.

WHSTEP joins the Falmouth Public Schools and Falmouth Academy in thanking the Woods Hole scientific community for its support during the local science fairs.

Visit the WHSTEP website at:

<http://www.who.edu/whstep/>

For announcements about events related to science and math, subscribe to the WHSTEP listserver at:

<http://lists.mbl.edu/mailman/listinfo/whstep>

For all WHSTEP questions, send an e-mail to:

[whstep-info@who.edu](mailto:whstep-info@who.edu)

## Mini-Grant Recipients

-Kama Thieler

WHSTEP offers mini-grants for teachers to provide support for new and innovative science, math, and technology programs in our member schools. During our recent funding rounds, these teachers received grants to incorporate new activities into their schools:

**Bob Laquidara**, a science teacher at Lawrence School in Falmouth, received funding to continue the “Shivericks Pond Water Sampling” project. This long-term partnership with the Waquoit Bay Reserve has resulted in a data set of water chemistry measurements dating from 1997.

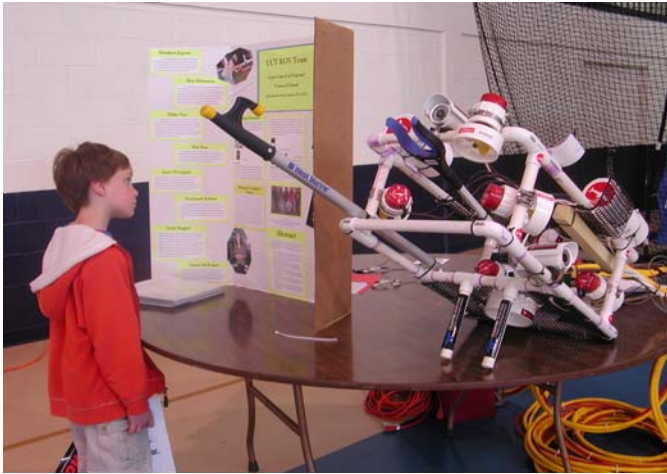
**Charles Cataldo**, Mashpee High School, used mini-grant funds for “Hydraulic and Pneumatic-Powered Robots”, a hands-on engineering experience in his Technology and Engineering class.

**Mike Looney**, a technology teacher at Mashpee Middle School, received funding for “Solar Powered Cars”. His students will research, design and build the cars as part of a renewable energy unit.

**Debra McRoberts**, a Motivated and Talented teacher at Mullen Hall and East Falmouth Elementary schools, will use mini-grant funds to supplement the earth science curriculum for fourth graders. The “Rock On” project will provide hands-on kits and teacher resources.

**Kerri Brennan**, a special education teacher at Morse Pond School in Falmouth, received funding for “Basic Math Facts and Fluency”. She plans to reinforce her students’ basic math skills and challenge them with manipulatives, games and resources.

**Thomas Hoppensteadt**, science teacher and Environmental Club advisor at Mashpee High School, was awarded funds for a project entitled “Naturalization of a Stormwater Retention Basin”. They will use mini-grant funds for native plants and erosion control materials as part of a habitat restoration and monitoring project on school grounds.



A young spectator examines the poster and vehicle from Upper Cape Tech at the Regional ROV Competition.



Falmouth High School's "Team WoHo" lifts their vehicle from the Mass Maritime pool after completing their mission.

## ROV Competition Comes to the Upper Cape

-Kama Thieler

The Northeast Regional Remotely Operated Vehicle (ROV) Contest was held at the Massachusetts Maritime Academy on April 25, 2009. The contest is part of the Marine Advanced Technology Education (MATE) Center's International ROV Competition. Twenty-one teams from schools from New Jersey to Massachusetts competed. Local teams included Upper Cape Tech, Falmouth High School, and Falmouth Academy. Students designed and built their own ROVs, a true test of a range of skills, from engineering to mission specifics. Mentoring, judging, grants and equipment were contributed by a number of local engineering businesses and scientific institutions. Falmouth High School placed 6<sup>th</sup> overall and won the Rookie of the Year Award. Falmouth Academy took the Team Spirit Award and Upper Cape Tech won the Judge's Special, an underwater camera and cable. FHS marine ecology teacher Cheryl Milliken said, "We've had a lot of great community support. The students are planning how to improve their design for next year!"

The WOODS HOLE SCIENCE AND TECHNOLOGY EDUCATION PARTNERSHIP (WHSTEP), established in 1989, is a partnership of schools, scientific institutions, businesses, and community resources. Its purpose is to support, promote, and expand science, math, and technology education and science literacy in the participating communities.

How to get involved:

- ✓ Attend a Partnership meeting in January or May, or a Science and Math Safari
- ✓ Contact an Executive Committee member or a liaison with program ideas or feedback
- ✓ Host a teacher tour or class field trip in your lab
- ✓ Volunteer to present your research at a WHSTEP event
- ✓ Serve as a mentor for a student science fair project
- ✓ Make a financial contribution to support WHSTEP programs and grants for teachers (WHSTEP is a 501-c-3 tax-exempt organization, the Woods Hole Oceanographic Institution serves as the fiscal agent for WHSTEP.)

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