Making Waves

At the University of Maine's Darling Marine Center

Ocean Science in the Classroom

Annette deCharon

Annette deCharon joined the School of Marine Science as a Senior Marine Education Scientist this fall. Based at the DMC, Annette brings cutting-edge science to middle school and high school classrooms across the country. Much of Annette's work is funded through the National Science Foundation's COSEE program (Centers for Ocean Sciences Education Excellence) and the National Aeronautics and Space Administration's Aquarius project.

COSEE
CENTERS FOR OCEAN SCIENCES EDUCATION EXCELLENCE
advancing ocean sciences education

www.cosee.net

Annette has established a thematic COSEE center focusing on Ocean Systems (COSEE-OS) whose goal is to bring ocean science to inland and rural school districts. Multi-media resources for teaching ocean science in the context of environmental and space sciences are being developed with interactive access to concepts similar to features found on the Phytopia CD-ROM (see sidebar). In addition, Annette is working with SMS faculty members like Lee Karp-Boss and Emmanuel Boss, and Herman Weller in the UMaine School of Education, to offer workshops at the DMC and semester-long courses in Orono to train educators on "teaching science by ocean inquiry."

Annette is also the Education and Public Outreach coordinator for the Aquarius mission. Aquarius is NASA's newest satellite instrument which is scheduled for launch in 2009. From it's orbit in space, Aquarius will measure sea surface salinity. The data will yield monthly maps of global ocean salinity–the first ever. In preparation for the new data stream, Aquarius has instructional material available for teachers on a wide variety of salinity, water cycle and climate concepts.

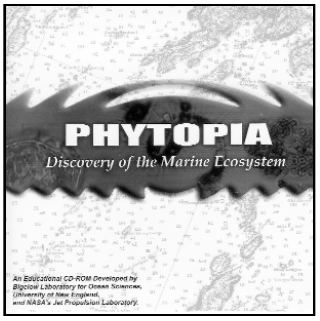
http://aquarius.nasa.gov

Abby Manahan

Working with Annette is Abby Manahan, Marine Education Associate. This position brings Abby's association with the DMC full circle. Abby (née Deitz) participated in the first Semester By the Sea program as an undergraduate student in 1993. She has been working for Annette on the COSEE and Aquarius projects since 2004.

Interact with PHYTOPIA

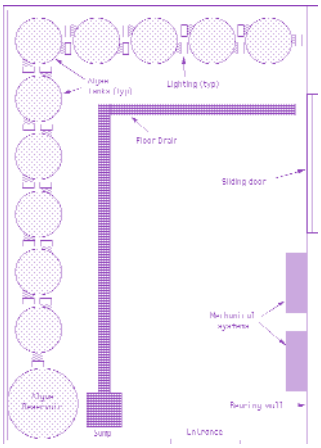
Phytopia is a CD-ROM full of information about microscopic marine life and the ocean ecosystem. Annette produced this teaching tool with scientists and educators at the Bigelow Laboratory for Ocean Science, the University of New England and NASA's Jet Propulsion Laboratory.

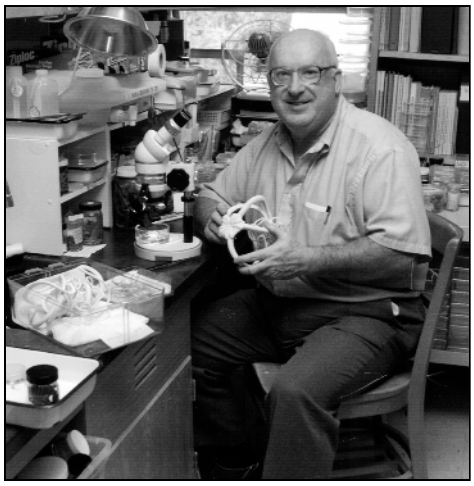


www.bigelow.org/phytopia

Maine Technology Institute Invests in the DMC

The Maine Technology Institute awarded $94,500 from the Maine Research Fund to Dr. Chris Davis of the Maine Aquaculture Innovation Center and UMaine's School of Marine Sciences, for the construction of an enlarged greenhouse with automated algal culture system at the DMC. The award will cover costs to construct a 13' x 18' greenhouse to house a SeaCaps continuous culture automated algal system. The system was developed in the UK and will deliver about 1000 liters per day of algae (about 6-8 times the current capacity) and also reduce technician time considerably.



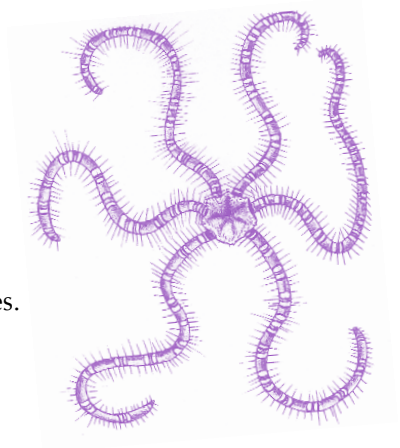


Dr. John Dearborn

Thanks to the Dearborns!

This year, Dr. John Dearborn, University of Maine Professor Emeritus of Marine Sciences, and his wife Bethel established the **John H. and Bethel B. Dearborn Darling Marine Center Fund**. This trust is to support education related programs at the DMC including: public education in marine science, undergraduate and graduate scholarships, and support for scientific conferences.

In addition, John donated a portion of his private collection of reprints, books and monographs to the DMC library. The donated materials encompass a wide spectrum of invertebrate biology and ecology, but a substantial number focus on echinoderms, John's specialty.



Paleo Contributions

Retired SMS faculty member Dr. Detmar Schnitker has also donated a portion of his private collection of research material to the DMC and Fogler libraries. Many of the donated items are books and journals in micropaleontology, marine chemistry, marine biology and paleoceanography. Thanks Detmar!

The Louise Dean Library Fund

In 2001, the DMC established the **Louise Dean Library Fund** to honor Louise Dean, the DMC's first librarian and to complement funding from the National Science Foundation that made the expanded library facility possible.

The fund is used for student computers, printers, carousels, bookshelves, and relatively small necessities that sometimes go unfunded in the larger scheme of things.

If you would like to make a donation, please send your tax deductible donation to:

Louise Dean Library Fund
Darling Marine Center
193 Clarks Cove Road
Walpole, ME 04573

Making Waves is the annual newsletter of the University of Maine's Darling Marine Center.

Darling Marine Center

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Dr. Kevin J. Eckelbarger, Director
Tim Miller, Laboratory Manager
Linda Healy, Science Writer & Events Coordinator

Dr. Gary King and Lisa Nigro

Chemolithotrophs in Marine & Freshwater Sediments

Lisa Nigro successfully defended her Master's thesis titled "Distribution and Diversity of Bacterial Chemolithotrophs in Marine and Freshwater Sediments", a topic not previously explored by scientists. Her advisor was Dr. Gary King. Chemolithotrophs can fix CO_2 and use inorganic compounds as a food source. Lisa hypothesized that chemolithotrophs in sediments would differ based on the relative availability of sulfide. Using molecular techniques to look at RuBisCO, a CO_2 fixation enzyme, she found that bacteria in sulfide-rich intertidal marine sediment mainly contained a RuBisCO gene type similar to that found in known sulfur-oxidizing bacteria. Sulfide-poor Damariscotta Lake sediment, however, largely contained a RuBisCO gene type mainly seen in carbon monoxide and hydrogen-oxidizing bacteria.

Lisa is currently working for Dr. Ann Bucklin at UCONN-Avery Point in Groton, CT. She is the lab manager of a zooplankton molecular ecology laboratory and part-time manager of COMMA (Center of Marine Molecular Analysis).

Save the Parrotfish!

Dr. Bob Steneck and Jeanne Brown

"Save the Parrotfish!" was the take home message of Jeanne Brown's Master's thesis "Multi-scale and Multi-species Interaction Strength of Damselfishes on Coral Reef Ecosystems." Working with advisor Dr. Bob Steneck, Jeanne spent hours underwater scouring the coral reefs of Bonaire to study the damselfish in reef ecosystems.

Protected as national parks with only a limited hook-and-line fishery, Bonaire's reefs are the healthiest on the planet and have significant herbivorous fish populations, including damselfish and parrotfish of all sizes. These herbivores eat the macroscopic algae that would otherwise overrun the corals.

Jeanne's research showed that damselfish eat some of the algae, but their territorial nature actually keep other smaller herbivorous fish at bay. Large parrotfish, however, were not deterred by the damselfish, grazing voraciously on macroalgae when and where they like.

Jeanne received a dual degree in Marine Biology and Marine policy. She now works for NY Sea Grant/ Cornell University Cooperative Extension Program helping Long Island municipal leaders with coastal watershed and stormwater management, abatement of non-point source pollution, and meeting requirements of the Clean Water Act.

Dr. Mary Jane Perry and Brian Thompson

Practical Applications for Thesis Data

Brian Thompson investigated the variability of phytoplankton biomass in the Damariscotta River Estuary, as well as environmental factors, such as nutrients, light, and physical conditions, in order to assess the estuary's ability to sustain shellfish aquaculture farms. He found highest chlorophyll-a concentrations in the upper reaches of the estuary, above Glidden Ledge. Brian concluded that environmental conditions favoring phytoplankton production, and a longer residence time for water north of this constriction promoted these higher concentrations. Throughout the study Brian posted his chlorophyll-a data on the web. These continued postings have been a useful resource for local aquaculturists who need to make informed decisions about the management of their sea farms.

Brian Thompson received a Master's degree in Oceanography for his thesis research titled "Phytoplankton Carrying Capacity in the Damariscotta River Estuary" and is currently a consultant for the Gulf of Maine Ocean Observing System.

Kelly Dorgan

One of the "Brilliant 10"

Popular Science magazine published their 5th annual "Brilliant 10" (October 2006) and graduate student Kelly Dorgan made the list! The "Brilliant 10" list highlights the up-and-coming leaders in scientific thinking. Kelly was selected for her research on the biomechanics of polychaete burrowing; an interesting combination of marine biology and engineering. The implications of her research go beyond basic polychaete biology, to the larger issues of bioturbation and the resulting burying/releasing of nutrients/pollutants in coastal ecosystems. Kelly is a Ph.D. candidate in UMaine's School of Marine Sciences. She works with Dr. Pete Jumars at the DMC. Read more at **www.popsci.com**

AAUS Appointment

Chris Rigaud

Chris Rigaud, UMaine Diving Safety Officer, was appointed to the Board of Directors of the American Academy of Underwater Sciences (AAUS) at the 2006 annual meeting. Chris has been an active member in AAUS since 1997. He has served on the Standards Committee reviewing diving manuals for member organizations and is currently Chairman of the Membership Committee. UMaine is a member of the AAUS and follows AAUS guidelines for Scientific Diver training and qualification.

Celebrating Anadromous Fish

When the Edwards Dam was breached in 1999, anadromous fish such as alewives, salmon and shad got access to 17 miles of the Kennebec River that had not been available to them since Abraham Lincoln was president.

On May 20th, 2006, Sea Grant and UMCE Extension Associate Dana Morse hosted the inaugural Spring Running in Augusta. The event celebrated the return of the sea run fish as well as the ecology and history of the Kennebec River with educational displays, fly tying/casting instruction, historical/cultural programs, food, music and more. For Dana, this was a chance to bring the marine world inshore and up river, and to highlight the importance of anadromous fish to the ecology of the ocean.

Plans are underway for The Spring Running 2007, to be held on June 2. For more information or to volunteer, please call Dana at (207)563-3146 x205, or visit the event website at **www.springrunning.com**.

Dana Morse catches his first shad on the Kennebec River.

2006 Publications

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King, G.M. and **C.F. Weber**. 2007. Distribution, diversity and ecology of the aerobic, CO-oxidizing bacteria: biogeochemical agents, plant symbionts and animal pathogens. Nature Microbiology Reviews. Accepted.

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Sackmann, B.S., L. Mack, M.G. Logsdon and **M.J. Perry**. 2004. Seasonal and inter-annual variability of SeaWiFS-derived chlorophyll-a concentrations in waters off the Washington and Vancouver Island coasts, 1998-2002. Deep Sea Research II 51: 945-965.

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Mei Sato and Dr. Pete Jumars

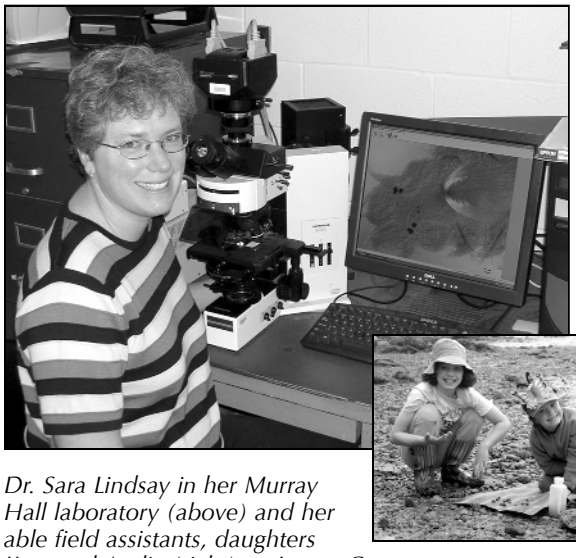
Secrets of Emergence Revealed

Emergence events were believed to be nighttime affairs, where under the cover of darkeness, epibenthic organisms could safely swim up into the water column to feed and reproduce. Using acoustic profiling, Mei Sato found that diel migration was only part of the emergence story–tidal periods also played a role. Mei collected acoustic data over a longer time frame than previous researchers and was thereby able to track seasonal patterns of emergence and to differentiate between diel and tidal migrations. Mei's data suggests that the mysid, *Neomysis americana*, has a diel pattern of emergence during the summer and a semidiurnal tidal rhythm in the fall. Such patterns reveal a more complex life history pattern of mysids as well as a greater degree of benthic-pelagic coupling. Mei received a M.S. in Oceanography for her thesis titled "Diel and Tidal Rhythms of Emergence Events Based on Acoustic Observations in a Shallow Estuary." Her advisor was Dr. Pete Jumars.

Dr. Mary Jane Perry and Brandon Sackmann

Satellites & Seagliders

Brandon Sackmann was awarded a Ph.D. in Oceanography for his dissertation "Remote Assessment of 4-D Phytoplankton Distributions off the Washington Coast." For nearly three decades oceanographers have had access to sea surface data (including ocean color and temperature) collected by satellites. More recently oceanographers have come to use a variety of autonomous underwater vehicles to provide in-water measurements of chlorophyll-a fluorescence, optical backscattering, temperature, oxygen concentrations and more. Using data from Seaglider (an autonomous underwater glider) and from satellites for waters off the coast of Washington state, Brandon developed methods to combine the two data sets into a 4-dimensional model of the water column. The result offers a clear look at water column characteristics below the sea surface and improves regional estimates of phytoplankton biomass. Brandon completed his Ph.D. with Dr. Mary Jane Perry and will be a postdoctoral fellow at the Monterey Bay Aquarium Research Institute (MBARI) working with John Ryan and Zbigniew Kolber.



Dr. Sara Lindsay in her Murray Hall laboratory (above) and her able field assistants, daughters Kate and Andie (right), at Lowes Cove.

Searching for Spionids in Lowes Cove

Each year between March and November, Dr. Sara Lindsay, Assistant Professor in the School of Marine Sciences, regularly visits the DMC to collect samples from Lowes Cove. At low tide the cove is mud flat, prime habitat for Sara's preferred specimens, spionid polychaetes. After roughly sorting the samples in the field, and maybe a quick check under a DMC microscope for further identification, she returns to Orono with a cooler full of mud and polychaetes for further study.

Sara is interested in both the physiology and the ecology of these infaunal worms. Of particular interest is spionid sensory perception which she has studied at various levels. On the molecular level she studies the mechanisms polychaetes use to sense chemical cues (chemoreception); on the ecological level she looks at how chemoreception coordinates feeding and sediment disturbance.

The sensory studies also involve mapping the spionid nervous system using such techniques as scanning electron microscopy and confocal microscopy. This work has lead to a better understanding of regeneration. Like many marine invertebrates, most spionid polychaetes can regenerate lost body parts, including not only their tails, but also their heads!

More information about Sara's research can be found on her website: **www.marine.maine.edu/~slindsay/index.htm**

Above: SBSer Nick Vamvas dons his dive gear. Right: Chris Rigaud and Anne Barrett do a safety check.

Snorkeling & Diving Program Added to SBS

The fall of 2006 marked the debut of the Semester by the Sea (SBS) Snorkeling and Diving Program. Initiated by UMaine Diving Safety Officer Chris Rigaud, the program is designed to enhance SBS laboratory and course work by encouraging students to get into the water.

The SBS program has long been known for its hands-on approach to learning and its courses are characterized by extensive field work. The Snorkeling and Diving program now adds an underwater dimension to the program. In cooperation with faculty and staff, SBS students were given the opportunity to participate in guided snorkeling trips and the first "in-water" field trip was added to the syllabus of Dr. Kevin Eckelbarger's invertebrate zoology course.

Chris hopes the program will continue to grow and provide SBS students with ever-increasing opportunities to immerse themselves in marine science.

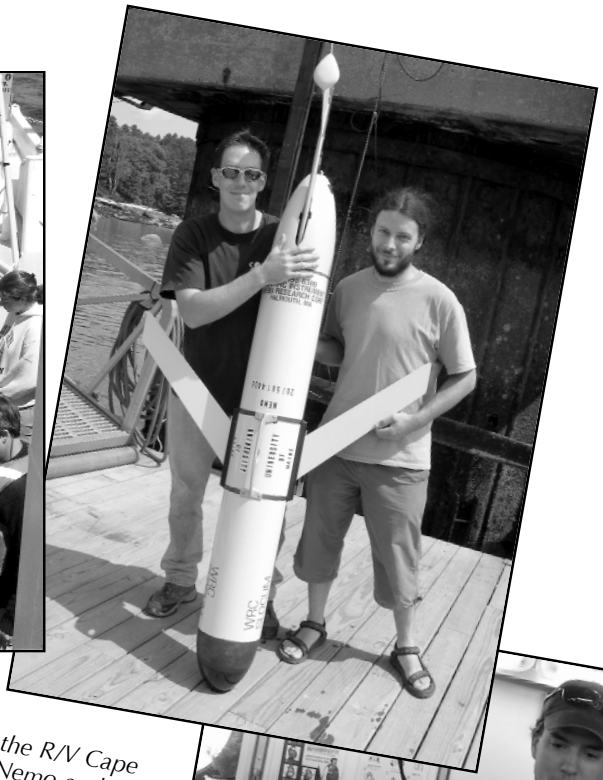
For more information about Semester by the Sea go to **www.dmc.maine.edu/sbs.html** or contact Dr. William Ellis, Assistant Director of the School of Marine Sciences at 207-581-4360.

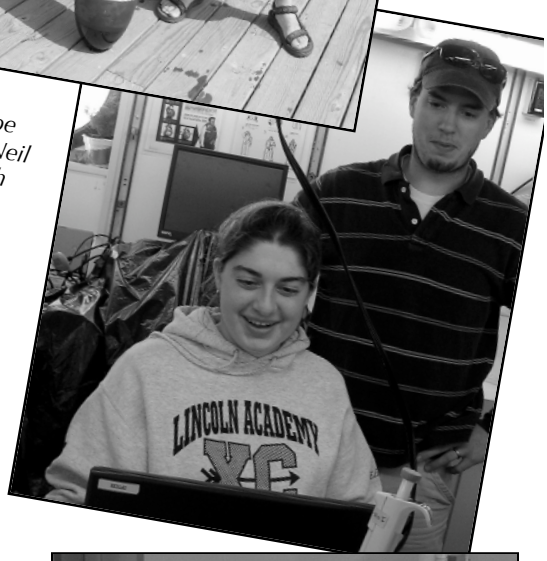
More information about the DMC's scientific diving program can be found at **www.dmc.maine.edu/SCUBA.html**

Nemo Glides in the Gulf

Dr. Mary Jane Perry, Dr. David Townsend, Dr. Neal Pettigrew and a team of engineers and students in the School of Marine Sciences brought a new level of resolution to oceanographic research when they launched an undersea glider named Nemo into the Gulf of Maine in June 2006.

Nemo is a six-foot long, torpedo-shaped autonomous vehicle that carries a host of oceanographic sensors for measuring temperature, salinity, oxygen and optical properties of seawater. It can be programmed to "glide" for up to 30 days and 1500km at depths ranging from 4-200meters. The typical gliding speed is about 1mile per hour.





Above: The Nemo Crew aboard the R/V Cape Hatteras. Above right: Rob Bell, Nemo and Neil Fisher. Right: Caleb Carter and Elizabeth Koch

On it's maiden voyage, Nemo traveled twice from Mt. Desert Island's Seal Cove to the mouth of the Damariscotta River. As it crossed Penobscot Bay, Nemo's salinity sensors delineated a lens of warm fresh water on the surface, discharge from the Penobscot River, and the colder saltier waters of the coastal current running at depth. The optical sensors measured phytoplankton biomass and particle concentration giving scientists the first 4-dimensional look at Gulf of Maine coastal waters.

Read more about Nemo in UMaine Today
www.umainetoday.umaine.edu/issues/v6i5/gulf.html

How Do Mussels Adjust to a Low Salt Environment?

Changes in environmental conditions can cause a variety of physiological responses in marine organisms. SMS graduate student Valerie Moreau wants to know if such physiological responses are associated with gene expression.

Working with Dr. Paul Rawson in the School of Marine Sciences, Valerie is studying the physiological response of juvenile blue mussels, *Mytilus edulis*, to decreased salinity. Through the spring and summer, Valerie kept *M. edulis* in the DMC's Marine Culture Facility. Using a protocol she developed, Valerie was able to quantify salinity stress by measuring oxygen consumption and ammonia excretion on individual juvenile mussels. The data suggest that when placed in low salinity waters, the young mussels have an initial shut-down, then a peak in energy expenditure (stress) for a couple of days, and then slowly acclimate to the lower salinity over a matter of weeks.

Using subtractive hybridization techniques, Valerie is now investigating patterns of RNA expression to determine if the expression of certain genes parallels the salinity acclimation curve. This represents the first quantitative genetic experiment on a marine bivalve to correlate physiologic response and gene expression.

Valerie Moreau

Read more about Valerie's research at **www.marine.maine.edu/~rawsonp/rawsonlab/people.htm**

Dr. Josef Ackerman (left), Visiting Scholar from University of Guelph, Ontario, Canada, and Dr. Pete Jumars (right)

Modeling Flow Around Worm Tubes & Sea Grass Stems

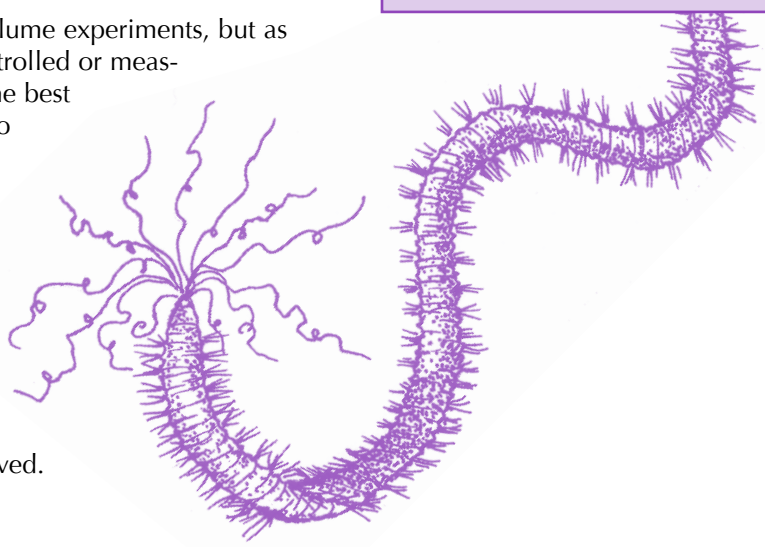
This fall, Dr. Josef Ackerman took advantage of the DMC's Visiting Scholar Program to work with Dr. Pete Jumars, a colleague in the American Society of Limnology and Oceanography (ASLO). Joe was on sabbatical from the University of Guelph, Ontario, Canada, where he is an Associate Professor of Environmental Sciences.

Joe and Pete are both interested in physical ecology. Much of Joe's work has been done in the freshwater environment with plants and bivalves, while Pete's research has focused on benthic marine organisms living in soft-sediments. Though the systems are different, the physical questions are similar. Small-scale topographic features such as worm tubes, sea grass stems or mounds of sediments can alter the flow of water, both horizontally across the sediment surface and vertically in and out of the sediment. Pete and Joe chose to examine the flow around two of these structures – worm tubes and sea grass stems, which basically can be described as tubes or rods.

The question is "when does a tube become a stem?" Is there a specific size (diameter or height or both) at which a tube ceases to function like a straw and begins to function like a rod? Additionally the team hopes to quantify the vertical exchange of water through the sediments; data that can help quantify biochemical transfers such as those of pollutants and nutrients.

Originally, Joe and Pete planned to conduct a series of flume experiments, but as they discussed all the parameters that needed to be controlled or measured, they decided that computer modeling would be the best place to start. Using a program called COMSOL, the two researchers are building numerical models. Testing the models in the flume will be a future project.

While in residence, Joe has become an active member of the Jumars lab and DMC community. He has also interacted with students and faculty at the School of Marine Sciences in Orono. Joe presented seminars at the DMC and in Orono that turned into small group discussions with graduate students and faculty. It is this interaction that makes the Visiting Scholar Program valuable to all involved.



Visiting Scholars Program

The DMC invites senior-level faculty and researchers to work in residence during the academic year, September to May.

Located in one of the most scenic areas of New England, the DMC is the perfect venue to write papers and books, conduct field work, or explore new research directions. We offer a stimulating intellectual atmosphere, a first-rate marine library, flowing seawater laboratories and state-of-the-art instrumentation.

Selected Scholars will receive *free* furnished housing and office space. Reasonable requests for laboratory space will also be accommodated. Scholars with families are welcome.

Preference will be given to applicants who will collaborate or interact with resident faculty and students in a way that will be mutually beneficial. Individuals who would like to teach a graduate or undergraduate course at the Center are encouraged to explore this option with the Director although this is not a requirement of the program.

Interested applicants should submit a letter of interest to DMC Director, Dr. Kevin Eckelbarger, outlining their proposed activities while in residence. Application letters will be accepted at any time. Scholars will be selected as space permits.

Visiting Graduate Student Awards

The DMC helps graduate students conduct marine biology and oceanography research on-site at our world class marine laboratory by offering in-kind awards that make field research logistically and financially possible. The awards provide up to $3,400 worth of housing, lab space, microscope use, boat time and SCUBA support to qualified graduate students.

Eligible students must be currently enrolled in a graduate program and preference is given to students who have had limited marine lab or field station experience and whose thesis research is field-oriented. Application information is available at www.dmc.maine.edu. The deadline for applications is February 15, 2007.

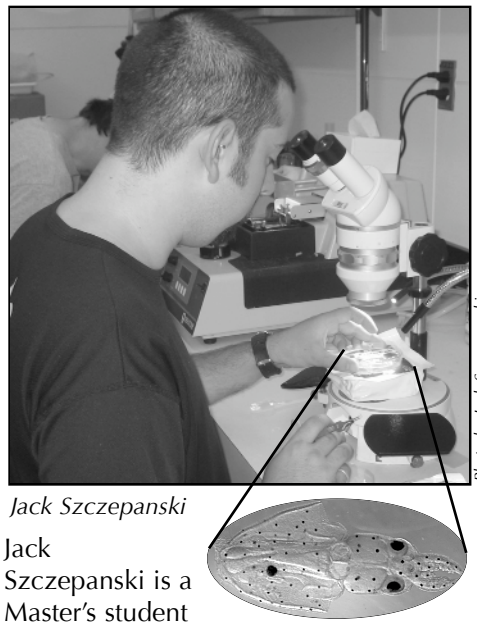


Photo by Jack Szczepanski

Jack Szczepanski

Jack Szczepanski is a Master's student at St. Joseph's University, PA. Working with Dr. Joe Thompson, Jack is studying how the contractile properties of mantle muscles of squid change during growth and the effect these changes have on jetting efficiency.

Using standard muscle physiological techniques and equipment, Jack set out to study these ontogenetic changes in the mantle muscle of the long-finned squid, *Loligo pealei*. However, the Philadelphia lab proved to be a hard place to keep specimens alive. As a Visiting Graduate Student at the DMC, Jack collected adult squid by hook and line, and egg cases from dock pilings near the lab using SCUBA. Jack hopes his research sheds light not only on the ontogenetic changes of mantle muscles, but also on the differences of ontogenetic development of cephalopod muscle mechanics and vertebrate muscle mechanics.

Photo by Tim Dwyer

Timothy Dwyer

Timothy Dwyer is a graduate student at Northeastern University working on a Master's degree with Dr. Geoff Trussell. He is interested in community ecology, biodiversity and bioinvasion. Tim's thesis research aims to answer questions about how communities resist invasions of non-indigenous species

Building on previous work conducted at the DMC by Dr. Phil Yund and graduate student Sheri Johnson (UMaine and University of New England) which provided genetic characterizations of the local ascidian populations, Tim set out to determine if genetic diversity makes a population more resistant to non-indigenous invasives. He cultured *Botryllus schlosseri* (an established species in the Gulf of Maine), and *Botrylloides violaceuis* (a recent invader) on LEGO DUPLO® blocks. He then pieced together assemblages of DUPLOs consisting of four genotypes of *Botryllus* with *Botrylloides* randomly interspersed. These assemblages are being cultured in the lab and in the field, and changes in the colony are being tracked using quantitative digital and image analysis.

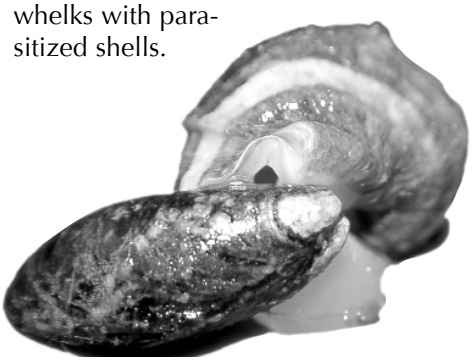
Photo by Jon Fisher

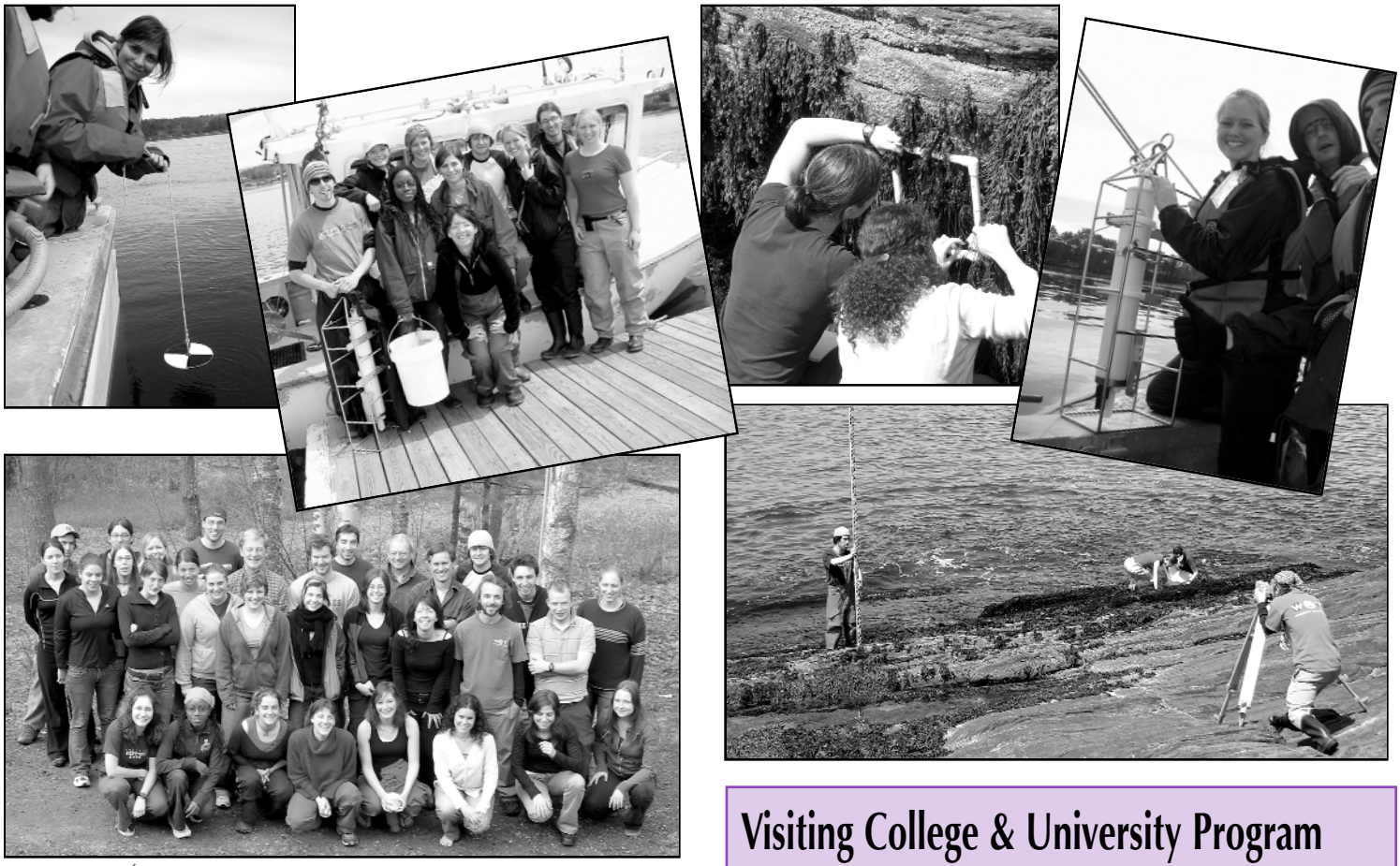
Jonathan Fisher

Jonathan Fisher is a Ph.D. candidate at the University of Pennsylvania working with Dr. Peter Petraitis. His dissertation focuses on the dog whelk, *Nucella lapillus*, and its role as predator, prey and parasite host in the intertidal community.

Since 2004, Jon has surveyed intertidal areas of the Gulf of Maine from Nahant, Massachusetts, to Cutler, Maine, to determine if the relative abundance of mussels and barnacles affect the prey choice of *Nucella*. Using an immunological protocol he devised, Jon determined the diet of individual whelks by testing the antigens present in their guts. In doing so, Jon discovered that the shells of whelks parasitized by the shell-boring polychaete *Polydora sp*. were easier to crack. This observation lead him to believe that parasitism may be an important, though cryptic, determinant of intertidal community structure.

This summer Jon conducted controlled feeding experiments in the DMC's flowing seawater lab. One set of experiments paralleled his work with prey-specific antigen signals. A second set, tested his idea that crabs (specifically the European green crab, *Carcinus maenus*) may preferentially select dog whelks with parasitized shells.





Photos courtesy of Émilie Castonguay and Dr. John Himmelman

Université Laval, Québec City, Canada

Dr. Ladd Johnson, Dr. John Himmelman and Dr. Julian Dodson, faculty at Laval University, have been using the DMC as a field station since 2000. Every other year, Ladd, John and Julian bring their Field Course in Marine Ecology to the DMC for a 10-day visit in May. This year marked their 4th visit. The group included the three faculty, two teaching assistants and 27 students.

During the first two days of the program, the three faculty expose the students to as many marine environments as possible: rocky, sandy and muddy intertidal habitats, and the estuarine environment of the Damariscotta and Kennebec Rivers. Students then break into three groups, each led by one of the professors. Students working with Ladd explore the behavior of periwinkle snails, while students working with John study intertidal zonation patterns. The third group, working with Julian, learn how physical factors such a salinity, temperature and density of seawater affect the distribution of fish larvae in estuarine systems. During this time the students conduct individual projects and prepare presentations on their findings. The trip concludes with a day of presentations and a traditional lobster dinner.

Visiting College & University Program

For over 15 years, academic institutions from Maine to Nebraska have staged their ocean explorations from the DMC. Our Visiting College and University Program invites professors and their classes to use the DMC as a field station. In addition to teaching laboratories, flowing seawater aquaria, microscopes and research vessels, we offer clean comfortable lodging in our waterfront dormitory and a full meal service. The following institutions have participated in the program:

Amherst College, MA
Baldwin Wallace College, OH
Bates College, ME
Bradford College, MA
Bowdoin College, ME
Brown University, RI
Bucknell University, PA
Colby College, ME
College of the Atlantic, ME
Connecticut College, CT
East Stroudsburg Univ., PA
Fairleigh-Dickenson Univ., NJ
George Washington Univ., DC
Gordon College, MA
Harvard University, MA
Laval University, QC, Canada
Manhattan College, NY
Mt. Holyoke, MA
Northeastern University, MA
Quinnipiac University, CT
SUNY, Geneseo, NY
Smith College, MA
Southampton College, NY
St. Lawrence University, NY
Unity College, ME
Univ. of Pennsylvania, PA
Univ. of South Alabama, AB
Villanova University, PA
Wayne State College, NE
Westfield State College, MA
Yesheva University, NY

Conant High School, NH
ConVal High School, NH
The Village School, NJ

Unity photos courtesy of Dr. Emma Creaser.

Photos of SMS 303 courtesy Dr. Andy Thomas

Professors,

Do you want to add a field component to your invertebrate biology and marine ecology class? Looking for ideas? Read what some of our long-time, and regular visitors are doing with their classes.

If we've sparked your interest, please contact Tim Miller at temiller@maine.edu for more information. We can customize your visit to fit your curriculum and your budget, and arrange lecture and laboratory assistance, too.

Unity College, Unity, Maine

Each autumn, Dr. Emma Creaser brings her Marine Biology class to the DMC. Since 1997, she has planned these weekend field trips around the tides. Arriving on a Friday afternoon in time to catch a low tide at Pemaquid Point (an exposed rocky shore), they either catalog the diversity of the marine creatures at that site, or conduct an interrupted belt transect to more quantitatively investigate the fauna and flora.

Emma always schedules a sampling cruise aboard the R/V Ira C. for Saturday morning because she knows "this is the only opportunity my students will have to see living subtidal fauna." On Saturday's afternoon low tide, Emma and the students go to Lowes Cove (muddy intertidal) to locate and identify all of the soft-bottom fauna they can find.

Back on shore, the class makes use of the flowing seawater classroom where students observe the feeding and locomotive habits of their specimens using dissecting microscopes and video cameras. In the evenings, everyone works in the library; designing experiments and reviewing relevant literature.

University of Maine, School of Marine Sciences

Dr. Andy Thomas teaches SMS 303, Integrative Marine Sciences: Oceanography. In one section of the course, Andy has the students plan and execute a research cruise whose mission is to describe the physical and biochemical structure in the Damariscotta estuary and nearshore Gulf of Maine.

Aboard the R/V Ira C., SMS 303 students make multiple water column profiles using a CTD to sample temperature, salinity and density, Niskin bottles set at standard depths to sample chlorophyll and nutrients (nitrate, phosphate, silicate and ammonia), and a Secchi to examine water clarity. The day-long field trip provides hands-on experience with commonly used oceanographic equipment and yields plenty of data for students to analyze

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The University of Maine
Darling Marine Center
www.dmc.maine.edu

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The 9th International Polychaete Conference will convene at the Holiday Inn By the Bay in Portland, Maine on August 12th, 2007.

The program will include reviews and current research on all aspects of polychaete biology and an expanded poster session.

Online registrations are now being accepted at www.dmc.maine.edu/worms.html

2007 Summer Program • More information at www.dmc.maine.edu

Shellfish Mariculture Techniques
May 21-25
A one-week course exploring the theory and practice of marine bivalve aquaculture in the Northeastern United States. SMS 309/598.
Instructor: Dr. Chris Davis.

Ecology of Marine Sediments
May 16-25
This May-term course is a mulyi-disciplinary examination of factors controlling ecological processes in marine sediments. SMS 514.
Instructors: Dr. Sara Lindsay, Dr. Pete Jumars & Dr. Larry Mayer.

Developmental Biology Teaching Workshop
June 12-15
A hands-on teaching workshop for college-level developmental biology teachers wishing to diversify their laboratory lessons.
Instructors: Dr. Leland Johnson & Dr. Eric Cole.

The Aquatic Invaders in Maine Program
June 25-29
An educational program for Maine middle school teachers on aquatic invasive species and related biodiversity concepts, introducing an experiential field component and Vital Signs technology.
Instructors: Esperanza Stancioff & Keri Lindberg.

Ocean Optics (*pending funding)
July 2-20
A cross-disciplinary graduate-level ocean optics course focusing on remote sensing, sensor technology and data interpretation.
Instructors: Dr. Emmanuel Boss and others.

Teaching Science by Ocean Inquiry
July 23-27
A five-day workshop in which high school physics teachers will team up with research scientists to promote ocean education and enhance science literacy.
Instructors: Dr. Lee Karp Boss, Dr. Emmanuel Boss & Dr. Herman Weller.

The DMC will be at the 2007 SICB meeting in Phoenix. Stop by our booth to learn more about our great visitor programs!