

Making Waves

At the Darling Marine Center

Undergraduate Opportunities Abound at the DMC

Undergraduate students serious about pursuing a degree or a career in marine science will find research and academic opportunities at the DMC that will open eyes and open doors.

Semester By the Sea (SBS)

During the fall semester, the School of Marine Sciences offers an accredited residential program for juniors and seniors from The University of Maine and other academic institutions. It is called Semester by the Sea (SBS) and it is based at the DMC.

SBS is a unique and rewarding experience. Students work hard. They follow the tides to sample organisms and map ship wrecks. Generally there is only one course per day so extended laboratory sessions and extra long field trips are the norm.

SBS 2003 course list on page 9.



Summer Internships

Summer 2003 will mark the DMC's 4th year of participation in the National Science Foundation's (NSF) Research Experience for Undergraduates (REU) program. Ours is one of only a few marine REU programs in the country.

REU fellowships draw academically outstanding undergraduate students who wish to pursue a future in science. At the DMC, REU fellows work closely with faculty mentors to design and complete independent research projects. Some of our fellows even attend scientific meetings and co-author papers with their advisors.

The original DMC internship program, the Summer Undergraduate Research Experience (SURE), continues to receive generous funding from the Gulf of Maine Foundation. SURE interns are also actively engaged in laboratory research and participate in many of the REU activities



Visiting College & University Program

Spring and fall are the busy seasons for our Visiting College and University Program. During these seasons, faculty from 25-30 US colleges and universities, including UMaine bring their marine science students to the DMC for weekend field trips.

Groups take advantage of the DMC's state-of-the-art flowing seawater classrooms, teaching laboratories and research vessels to sample and observe the marine environment of midcoast Maine.

As a field station, the DMC provides room and board, and teaching facilities at reasonable rates; nature provides the mudflats, sandy beaches and rocky shore.



Learn more about undergraduate opportunities at the DMC

www.dmc.maine.edu



R/V Ira C. Gets A-frame

Since our last newsletter the DMC's 42' R/V Ira C has been fitted with an 11' articulating A-frame and a 2500 pound winch with 300 fathom of 5/16" wire. In the near future, we plan to install a conductive cable winch, too.

This equipment will allow UMaine and visiting scientist to deploy larger and more sophisticated gear for sampling the benthos and the water column, both in the Damariscotta River Estuary and the Gulf of Maine.

DMC Related Crustacean Specialists Teach Course in Chile

Dr. Martin Thiel and Dr. Exequiel Gonzalez were both Ph.D. students at the DMC with Dr. Les Watling. They are now both professors at the Universidad Católica del Norte in Chile.

This September they put together the First International Course on the Ecology and Taxonomy of Peracarids and invited their former advisor to Chile as a co-instructor.

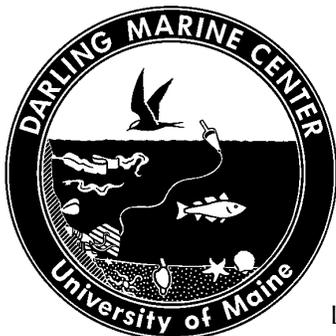
The two-week course was an introductory course on the taxonomy, morphology, biology and ecology of the peracarid crustaceans and geared to postgraduate students. Seventeen people from south and central America, including the countries of Mexico, Uruguay, Chile, and Brazil attended the course.



Peracarid course instructors Dr. Martin Thiel, Dr. Les Watling and Dr. Exequiel Gonzalez. The fourth instructor was Dr. Richard Heard, Univ. of Southern Mississippi (not pictured).

Recent Publications

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- Dethier, M.N. and R.S. Steneck, 2001. Growth and persistence of diverse intertidal crusts: survival of the slow in a fast-paced world. *Mar. Ecol. Prog. Ser.* 223: 89-100.
- Devin, M.G. 2002. Land-based echinoculture: a novel system to culture adult sea urchins. In: *The Sea Urchin: From Basic Biology to Aquaculture - Proceedings of the Workshop at the International Marine Centre, Torreggrande, Sardinia, Italy, November 2000*. Eds: Yokota, Y., Matranga, V., Smolenicka, Z. A.A. Balkema, Lisse, The Netherlands. Pp. 145-160.
- Eckelbarger, K.J., C.M. Young, E. Ramirez Llodra, S. Brooke, and P.A. Tyler. 2001. Gametogenesis, spawning behavior, and early development in the "ice-worm" *Hesiocaeca methanicola* (Polychaeta: Hesionidae) from methane hydrates in the Gulf of Mexico. *Marine Biology* 138: 761-775.
- Eckelbarger K.J. and C.M. Young. 2002. Spermiogenesis and modified sperm morphology in the "seepworm" *Methanoaricia dendrobranchiata* (Polychaeta: Orbiniidae) from a methane seep environment in the Gulf of Mexico: implications for fertilization biology. *The Biological Bulletin* 203:134-143.
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- Giessing A, and T. Lund. 2002. Identification of 1-hydroxypyrene glucuronide in tissue of marine polychaete *Nereis diversicolor* by liquid chromatography/ion trap multiple mass spectrometry. *Rapid Commun Mass Spectrom* 16:1521-1525.



Darling Marine Center

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- Gonzalez, E. & **L. Watling**. 2002. Redescription of *Hyalella azteca* from its type locality. *Journal of Crustacean Biology* 22(1):173-183.
- Mayer, L.**, L. Benninger, M. Bock, D. DeMaster, Q. Roberts and C. Martens. 2002. Mineral associations and nutritional quality of organic matter in shelf and upper slope sediments off Cape Hatteras, USA: A case of unusually high loadings, *Deep-Sea Research*, 49:4587-4598.
- Shull, D.H. and **L.M. Mayer**. 2002. Dissolution of particle-reactive radionuclides in deposit-feeder digestive fluids, *Limnology and Oceanography*, 47:1530-1536.
- Steneck, R.S.** and C.J. Wilson. 2001. Long-term and large scale spatial and temporal patterns in demography and landings of the American lobster, *Homarus americanus*, in Maine. *Journal of Marine and Freshwater Research*. 52:1302-1319.
- Steneck, R.S.** 2001. Functional Groups. Pages 121-139 in Levin, S. (ed). *Encyclopedia of Biodiversity*. Vol. 1. Academic Press, Inc.
- Steneck, R.S.** and J.T. Carlton. 2001. Human alterations of marine communities: Students Beware! pages 445-468 in Bertness, M, Gaines, S., and Hay, M. (eds). *Marine Community Ecology*. Sinauer press. Sunderland, MA.
- Thomas, C.J., N.E. Blair, M.J. Alperin, D.J. DeMaster, R.A. Jahnke, C.S. Martens, and **L. Mayer**. 2002. Organic carbon deposition on the North Carolina continental slope off Cape Hatteras (USA), *Deep-Sea Research* 49:4687-4708.
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Dr. Kevin Eckelbarger with Nancy Trantin, Ira Darling's granddaughter, and her husband Robert Trantin during their summer visit to the Center.

A Darling Family Visitor

This summer we had an unexpected visit from Nancy Trantin, the granddaughter of DMC founder Ira C. Darling. Nancy and her husband, Robert, were traveling up the coast from Florida when they decided to stop by and see the old family farm. Nancy hadn't been to the property since she was a child. She was amazed and pleased with the development of Ira's precious farm and was happy to see it thriving. It was great fun to walk the property with someone who remembered the farmhouse as a residence, the horse barn before it became a library, and the lower campus without any labs.



Going Digital at High Resolution with a New(er) EM



The electron microscopy lab jumped into the digital age this fall with a newer, though not brand new, transmission electron microscope. Parts were just no longer available for the old analog Zeiss, which came to the DMC with the generous help of Dr. Mel Fuller and the Gulf of Maine Foundation ten years ago.

The new machine, a Zeiss EM 900 transmission electron microscope, is digital-capable with magnifications up to 400,000 times and a computer-controlled camera system with data-recording options.

Dr. Kevin Eckelbarger and graduate students Anne Simpson and Sheri Johnson are already planning numerous projects using the new instrument.



Wai Ki Awarded Ph.D.

Wai Ki Chung, graduate student with Dr. Gary King, successfully defended his Ph.D. dissertation titled *Polycyclic Aromatic Hydrocarbon Degradation by Novel Bacteria Isolated from Burrow Sediments of Marine Benthic Macrofauna*.

Polycyclic Aromatic Hydrocarbons (PAHs) are recalcitrant pollutants released to the environment through various anthropogenic activities such as oil spills. Wai Ki isolated bacteria from burrow walls and studied their potential as PAH degraders. Burrow wall sediments are biogeochemically distinct from bulk sediments in that they have intense microbial activity and a higher availability of oxygen.

Wai Ki found that burrow sediments did indeed have a higher PAH degradation potential than bulk sediments and that the degradation potential was sensitive to oxygen levels. He set out to isolate the bacteria involved in the process and found two novel isolates, one from *Nereis* burrow walls and the other from *Maya* burrow walls. Further assays proved that both isolates, especially those from *Nereis* sediments, could be useful as bioremediation.

Upon completing his Ph.D., Wai Ki returned home to Hong Kong and now works for CK Life Sciences, one of the largest biotech companies in Hong Kong. His main focus is on the bioremediation of animal waste in wastewater. Wai Ki's position occasionally requires travel and he will be back in the US this fall working on a site in Michigan. **Congratulations!**



Amanda recently completed her master's degree. Her thesis was titled: *A new apex predator in the Gulf of Maine? Large, mobile crabs (Cancer borealis) control benthic community structure.*

Congratulations!

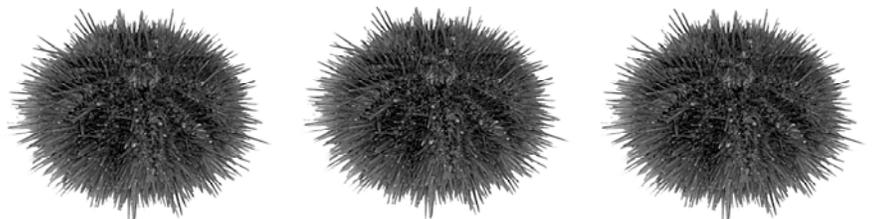
Amanda Receives Prestigious Knauss Fellowship

This summer, Amanda Leland received the prestigious Dean John A. Knauss Marine Policy Fellowship. Sponsored by NOAA's National Sea Grant College Program, this fellowship offers highly qualified graduate students a chance to get involved in marine policy at the legislative or executive level of the federal government in Washington, D.C. This year, more than 100 graduate students from across the country competed for the 10 positions available in the U.S. Congress and 28 in the Executive Branch. Amanda was chosen for a Legislative branch position and leaves for the Capitol in November.

Amanda recently completed a master's degree in marine biology. Her thesis research focus on the ecology and life history of the green sea urchin and whether or not the species can be re-established in areas along the Maine coast where it has essentially disappeared over the last 15 years due to over harvesting. Her research brings together sea urchin harvesters, fishery managers, and scientists to explore different options to restore urchin stocks and manage the fishery. The results of Amanda's research could help determine whether planting urchins in depleted areas is a reasonable management option.

Amanda is looking forward to the Knauss Fellowship program to provide her with the experience in federal marine policy that she needs to become an effective marine conservationist. As she says, "My time in Maine has given me a unique understanding of how science can involve, affect, and be disseminated to stakeholders. I hope to bring this perspective to the federal level where direct communication between policy-makers and stakeholders is far more limited."

Amanda's graduate advisor Bob Steneck says, "With her experiences from the Knauss Fellowship, she will go beyond the world of marine ecosystems and fisheries in the Gulf of Maine to the policy arena, which will give her a national and international perspective."



Honorable Mention



Anders finishes long distance Ph.D.

Graduate student Anders Giessing began his course work and research here at the DMC in 1997 and returned to Denmark with his family three years later. Working closely with advisor Dr. Larry Mayer and making a couple of extended trips to the US every year, Anders managed to keep his degree on track.

Anders' dissertation was titled *Biogeochemical fate of sediment associated PAH: Effect of Animal Processing*. Building on the work of other researchers in the Mayer lab who studied the bioavailability of nutrients in muddy sediments, Anders looked at the bioavailability of pollutants, namely pyrene, in these sediments and how it was metabolized by deposit feeding animals, notably the marine worms: *Nereis virens*, *Arenicola marina* and *Capitella sp.*

Pyrene is a carcinogenic polycyclic aromatic hydrocarbon (PAH) commonly found in oil-polluted marine sediments. Anders found that when this PAH was ingested and metabolized by the marine worms, the resulting fecal matter contained three metabolites that had reduced bioavailability and toxicity to other infauna. Anders also found that though marine deposit feeders do metabolize PAH into apparently less toxic compounds, these compounds are further degraded by infaunal bioturbation, increased oxygen availability and microbial activity.

Anders hopes to get a Postdoctoral Fellowship at the University of Southern Denmark funded by the Danish Natural Science Research Council to look at the impact of deposit-feeding invertebrates on preservation of organic matter in marine sediments.

Visiting Scientists

Lobster Fishery or Lobster Farm

Herring is the primary lobster bait used in Maine. Each year, lobstermen bait their traps with thousands of pounds of Atlantic herring. The bait presumably offers a convenient food source for small lobsters that easily come and go from the traps. In addition, as traps are pulled and rebaited, the discarded bait becomes available for a host of benthic animals including lobsters. Is this ready supply of food the means by which the lobster population remains strong despite ever increasing landings?

Working in conjunction with scientists from the Darling Marine Center, the Maine Department of Marine Resources, the Gulf of Maine Aquarium, and lobster fishermen from up and down the coast, Dr. Jonathan Grabowski, Dr. Erika Clesceri and Adam Baukus are conducting extensive field research and controlled experiments in the DMC flowing seawater laboratory to determine if we are farming lobster in Maine waters.

Currently the research is focusing on the fate of discarded herring on the benthic community and the relative contribution of herring to the lobster diet. They have also been comparing lobster growth and population characteristics (i.e., size frequencies) in areas with and without added herring from fishing. Funding for this project comes from the Northeast Consortium.



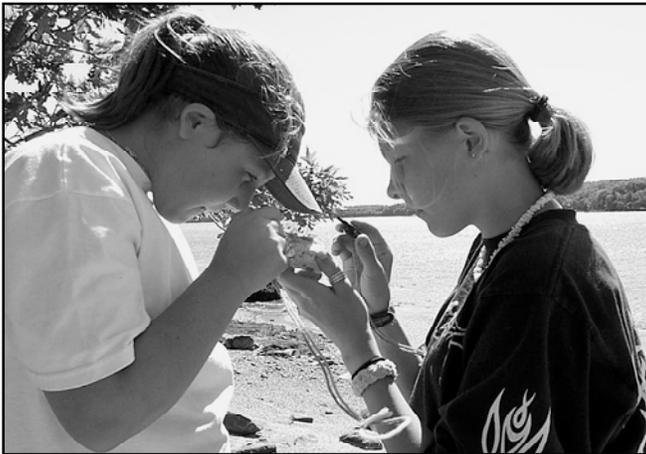
Lobster researchers: Adam Baukus, Dr. Erika Clesceri and Dr. Jonathan Grabowski.

Gulf of Maine Foundation



Touchy Feely

This summer the Gulf of Maine Foundation installed a new outdoor touch tank system at the Darling Marine Center. The tank, with bench style steps and shelves, allows kids of all sizes to comfortably peer into the tank and tickle the animals.



School Programs

For the third year in a row, the Gulf of Maine Foundation has brought local school groups and home schoolers to the DMC for lessons about the marine environment. K-12 Education Coordinator Jan Faulkner hosts hundreds of students each spring and fall.

Prior to class visits Jan works with the teachers to ensure her coastal lessons parallel classroom studies and meet the State of Maine Learning Results. Some groups come for just one session, though others, like the 3rd and 5th graders from the local Bristol Consolidated School come three times. This is a scenario Jan especially likes because “each time a group returns, the students are more engaged and ready to learn.” Often times, Jan visits the school for more one last lesson. This allows her time to help students analyze data collected at the DMC or to give a wrap-up lesson.

Summer 2002

In a fun-filled summer, the Gulf of Maine Foundation (GMF) provided a variety of educational activities for the local community. The GMF's programs included natural history walks, evening lectures by prominent scientists and artists, marine activities for visiting day camps, and more.

Back by popular demand, the K-4 kids' program Marine Mania was expanded from six weeks to eight, with four new programs added. This summer kids and parents explored the mud and its inhabitants in Lowes Cove, the geology of the rocky points along the River Bluff Trail, and the diverse habitats available on the DMC campus.

The Kieve Science Camp for Girls again included a day at the DMC as one of its major components in a week-long program for middle school girls. The science campers spent the morning delving into the mudflats in Lowes Cove, then examining critters under the dissecting microscopes in the Mitchell Classroom. With expert assistance from DMC graduate students Ian Voparil and Kelly Dorgan, GMF education consultant Maya Crosby and summer intern Bess Koffman were able to give the girls a full mudflat ecology experience—including a refreshing facial scrub.

Afternoon activities included a plankton tow, a demonstration of aquaculture growing techniques, and a tour of the touch tank and the Flowing Seawater Lab. Students also learned about coastal geology, including a hands-on demonstration of metamorphic processes. The new curriculum, designed this year by Bess, was met with enthusiasm—and lots of muddy clothing!

The Gulf of Maine Foundation (GMF) is a non-profit organization founded in 1986 to foster the growth and development of marine studies at the Darling Marine Center.



For more information or to become a member, contact:
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National Science Foundation GK-12 Teaching Fellows Program Starts in Maine

With a \$1.3 million grant from the National Science Foundation (NSF) Dr. Susan Brawley and five other UMaine faculty collaborated with four local school districts to establish the first GK-12 Teaching Fellows Program in the State of Maine.

The National Science Foundation established the GK-12 Teaching Fellows program to provide:

- teaching skills for graduate students
- enriched learning for K-12 students
- professional development for K-12 teachers
- strengthened partnerships between institutions of higher education and local school districts.

For the 2002-2003 school year there are 12 teaching fellows teamed up with 24 teachers in 14 schools in the Orono, Bangor, Old Town area. Before the school year begins teachers and fellows go through "Science Camp" a 5-day training session where they review the State of Maine Learning Results to which the program's success is tied.

The NSF program has proved to be a great success in Maine and across the country. In the past two years, the UMaine program has influenced almost 2000 school children in grades 2-12 in these districts. Dr. Brawley has applied to the NSF for continued and additional funding for UMaine's GK-12 Fellows. If support is granted she hopes to expand the program to the local schools surrounding the DMC.

For more information about the University of Maine's GK-12 Teaching Fellows program visit the web site: <http://www.umaine.edu/NSFGK-12/Default.htm>



DMC Grad Participates in GK-12 Teaching Fellows Program

During the 2001-2002 school year, graduate student Anne Simpson spent two days a week teaching science to 4th and 5th graders. Anne, was one of twelve graduate students chosen to participate in The University of Maine's GK-12 Teaching Fellows program.

Anne was teamed up with Mrs. Carolyn Smith of Helen Hunt Elementary in Old Town and Mrs. Brenda Jackson at Viola Rand Elementary in Bradley. Working with the teachers' set curriculum and focusing on the State of Maine Learning Results, Anne developed classroom exercises and field trips to teach the kids about the universe, geology, food webs and marine science.

The school year for Hunt Elementary's 5th grade class culminated in an all-day field trip to the DMC. The group went out aboard the Center's research vessel for a collecting trip and, back in the classroom, hooked into an electronic field trip to the Smithsonian's Environmental Research Center in Edgewater Maryland.

Connected with ITV, Anne and the Hunt Elementary 5th graders taught a group of Maryland students about the Damariscotta River Estuary and the Gulf of Maine. In return, the Maryland group taught our students about the brackish water of the Rogue River that flows into Chesapeake Bay. On camera, groups tested water temperature and salinity, described the shore lines and the bottom sediments, and compared the plants and animals that grew in each environment. It was a splashing success!

Conferences



Equatorial Pacific Researchers Convene at the DMC to Fine Tune Models

The Equatorial Pacific is a unique part of the world's oceans. These waters are high in nutrients, but low in chlorophyll and phytoplankton. Many believe that if primary production in the equatorial Pacific were greater, these waters would have the potential to be an awesome sink for the carbon dioxide (CO₂) accumulating in the atmosphere.

The draw down of atmospheric CO₂ would work as follows: If primary productivity in the Equatorial Pacific were greater, the phytoplankton population would be greater and more CO₂ pulled out of the air through the process of photosynthesis. The abundant phytoplankton would in turn maintain additional marine life further up the food web. Eventually, phytoplankton and/or their consumers would die and sink to the deep ocean; eventually becoming part of the geologic record.

For decades, scientists have wanted to find out why the equatorial Pacific is not more productive and have searched for a limiting factor. In the late 1990's a group of international oceanographers, remote sensing specialists, mathematicians, and computer modelers participated in the Joint Global Ocean Flux Study (JGOFS).

The goal of the JGOFS was to identify and quantify the chemical, physical and biological systems in the Equatorial Pacific and develop a large model of the region. Several years of



research culminated in a special issue of the journal *Deep Sea Research* which was published in 2000.

Two years and much data later, JGOFS researchers convened at the DMC to discuss new advances and make improvements to the model. The Equatorial Pacific Synthesis and Modeling Workshop (EPSMW) was co-organized by Dr. Fei Chai of UMaine's School of Marine Sciences and Dr. Robert Le Borgne of Centre IRD in New Caledonia, and proved to be a great success.

The workshop summary concludes "Knowledge in this area has reached a whole new step, thanks to the impressive international field work that has been done..."

New information on climate variations, biological issues such as microbial activity, and the potential of silicon and iron as limiting factors had also come to light. This information and the many advances in the knowledge of small-scale processes will now be incorporated into the regional model.

Conference & Workshop at the DMC!

The Darling Marine Center is the perfect venue for your next scientific conference or educational workshop.

We have comfortable meeting space as well as flowing seawater classrooms and laboratories suitable for hands-on workshops. In the immediate vicinity we have a wide variety of marine ecosystems, everything from calm mudflats to exposed rocky headlands. To top it off, we offer a variety of housing options, great food and beautiful scenery.

For more information contact our Conference Coordinator at 207-563-3146, ext. 200 or by e-mail at lhealy@maine.edu

Conferences

New Waves in Marine Sciences

In May, nine reporters and freelance writers visited the DMC as participants in *New Waves in Marine Sciences*, a media fellowship program designed to heighten the awareness of science writers to marine related issues.

The week-long program was tailored to the participants' interests in marine ecology, underwater habitats, ocean monitoring, fisheries management, aquaculture, and seafood products. The workshop provided background information and direct contact with scientists working on these and other issues in Maine and around the world.



a C.A.S.E. media fellowship



The group toured UMaine's marine research facilities including the Orono laboratories of the School of Marine Sciences and the Darling Marine Center. They also visited commercial salmon farms Downeast, and met with representatives from local non-profit organizations, and participated in open discussions with university professors, fishermen and aquaculture industry representatives to get a full understanding of the issues facing marine scientists.

Participants represented news organizations in Maine, including the Portland Press Herald, Aquaculture News and Bar Harbor Times, as well as out-of-state media such as Science Magazine, National Public Radio and Maryland Public Television.

New Waves in Marine Sciences was sponsored by the Council for the Advancement and Support of Education (CASE) with support from the University of Maine's Vice-President for Research and Department of Public Affairs. The program won kudos from all involved and recently received funding to repeat the program in May 2003. For more information contact Nick Houtman at houtman@maine.edu.

Semester by the Sea is a unique residential program offered by the University of Maine's School of Marine Sciences at the DMC for college juniors and seniors. Most courses are taught by DMC resident faculty and take full advantage of the DMC's research vessels, flowing seawater laboratories and classrooms. Extensive field trips to marine habitats of the midcoast Maine area are part of every course.

Choose from such courses as:

- Invertebrates of the Maine Coast
- Marine Ecology
- Human Impacts on the Ocean
- Maritime History & Archaeology
- Design of Marine Organisms
- Introduction to Biological Modeling

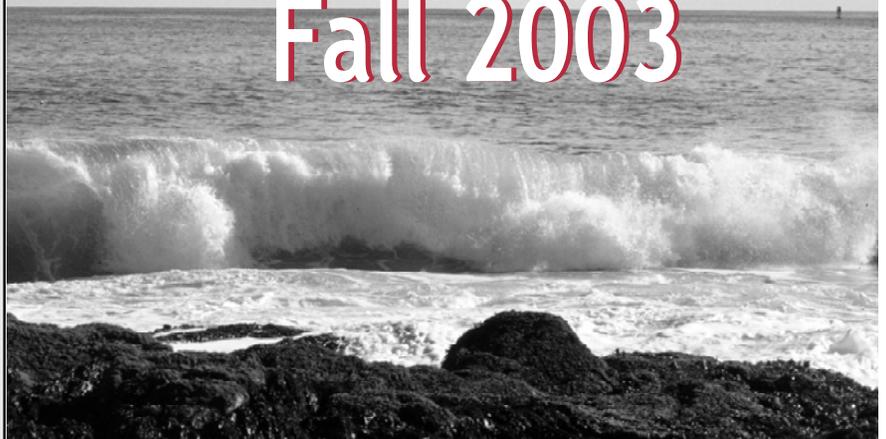
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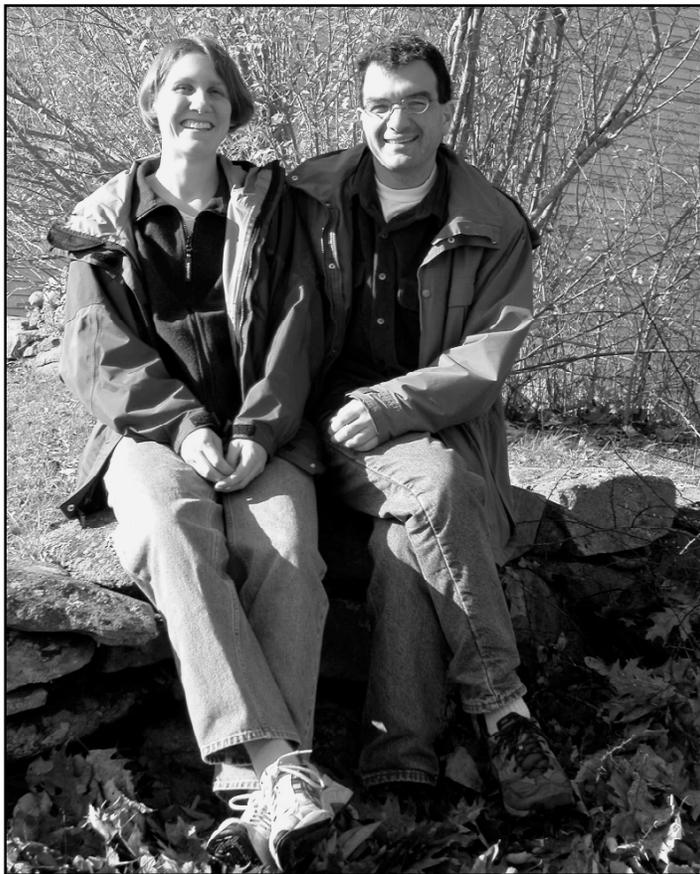
School of Marine Sciences

Semester by the Sea

Fall 2003



On Sabbatical at the DMC



Amy Adams and Dr. David Secord at the DMC on sabbatical leave from University of Washington, Tacoma.

Dr. David Secord, Associate Professor of Biology & Environmental Science Coordinator (UWTacoma) and Adjunct Associate Professor of Zoology (UW Seattle) is spending the fall and winter on sabbatical at the DMC with his wife Amy.

Dave was hired by the University of Washington in 1996 as the first biologist at the new and rapidly growing Tacoma campus. A couple of years ago, Dave and Dr. Cheryl Greengrove, a physical oceanographer at UWT, were charged with developing a new environmental science program for the university. The last several years have been full of such administrative duties as curriculum design and overseeing new laboratory construction.

Needless to say, Dave's research has taken a back seat to his teaching responsibilities and newly acquired administrative duties. He has taken a sabbatical leave to catch up on a backlog of data analysis and paper writing.

Dave's research falls into the category of experimental ecology and life history biology, and his work primarily involves two west coast species of anemonies *Anthopleura elegantissima* and *A. xanthogrammica*.

One current project involves intracellular algal symbionts known as zooxanthellae and zoochlorellae. He is studying how the physiological differences between these symbionts

determine which microhabitat they inhabit and which anemone they choose as host. Some of this work has been in collaboration with Gisele Muller-Parker at Western Washington University.

Dave's other anemone project examines the trade-offs between sexual and asexual reproduction. Specifically he is looking at the cues that signal *Anthopleura elegantissima* to divide asexually by longitudinal fission. Here he is studying the roles of genotype and environment on growth, fission, and movement rates. Much of this work has been done in collaboration with Vicki and John Pearse at UC Santa Cruz and Claudia Mills at Friday Harbor Labs.

In addition to writing papers, Dave has taken the opportunity to participate in a number of workshops, and conferences held in the New England area this fall. He attended the Gulf of Maine Forum to gain a comparative appreciation of the major issues affecting the Gulf of Maine (pollution, fishing impacts, invasive species, recreation) that also affect Puget Sound. And will be presenting several seminars at UMaine, UNH, UMass and Smith College this winter and next spring.

When asked why he chose to come to the DMC for sabbatical, he jokingly says, "...to get as far away as I could from Washington." On a more serious note, he recognized that the DMC is "gaining a national reputation as a place with a great group of resident faculty and a stimulating place for visitors."

So far we are really enjoying New England generally and coastal Maine specifically. I am grateful that DMC – with its library, excellent lab and office facilities, and great faculty and staff – is such a wonderful, welcoming place. Thank you!

Dave Secord

Dave's wife, Amy Adams, has also taken a sort of sabbatical leave. Her goal is to define a career track that encompasses her broad range of interests and talents, including freelance writing, architectural research and historical preservation. Amy says, "Luckily, Dave's sabbatical came at the perfect time and is giving me the opportunity to actually work out the logistics of doing so!"

She wants to establish a house history business upon returning to the Puget Sound area. The business would target people wishing to remodel old homes with historic accuracy. Her business may also attract those merely interested in the histories of their homes or commercial properties.

Meanwhile, she is also pursuing her dream job — that of a full-time writer. Since arriving in Maine she has been writing a mystery set in Acadia National Park during the 1920's.... be sure to watch the New York Times Best Seller List!

Postdoctoral Research



Dr. Kari Dunfield joined Dr. Gary King's microbial ecology laboratory at the DMC as a postdoctoral fellow this spring after completing her Ph.D. at the University of Saskatchewan, Canada.

Kari's dissertation was titled *Impact of field-grown genetically modified canola on the diversity of rhizosphere and root-interior microbial communities*. Her research used DNA analysis along with traditional microbiological techniques to identify changes to the structure of microbial communities in the soil caused by the growth of genetically modified plants.

She chose to come to the DMC, in part, to broaden her research experience from a strictly soil and agricultural background to look at other environments such as marine sediments. As it turns out, Kari is studying microbial communities in Hawaiian volcanic deposits. Specifically, she is trying to assess the diversity of carbon monoxide oxidizers in these soils. To do this she is using molecular biology techniques to analyze the microbial DNA.

Upon completing her work at the DMC she hopes to secure a tenure track job with both teaching and research responsibilities at a Canadian university.



Dr. Jennifer Boehme moved from Florida to Maine for a true postdoc experience – the opportunity to work on new projects in a new location.

Jen received her Ph.D. from the University of South Florida for her work on dissolved organic matter (DOM) in the Tampa Bay Estuary. Using fluorescence techniques she was able to determine the quality and quantity of DOM in these waters.

Here at the DMC, Jen will be working with Dr. Mark Wells and will be studying DOM in the Damariscotta River Estuary and the Gulf of Maine. However, this time she will fractionate, or sort, the DOM and then study the fluorescence of each size fraction to determine the make-up of these tiny particles.

Having never been to the Northeast, Jen is looking forward to experiencing a real Maine winter, and learning to ski and snowshoe. She hopes her research here at the DMC will lead to a research position at either a government agency or university.



Dr. Karen Orcutt is a biological oceanographer interested in how marine plankton influence elemental cycling in the ocean.

She received her Ph.D. from the University of Wales, Swansea. From there it was on to Sweden and then England for continued research.

Karen's Ph.D. research was conducted primarily at the Bermuda Biological Station where she examined the environmental factors regulating N₂ fixation by the cyanobacteria *Trichodesmium* in the Sargasso Sea. She found a strong correlation between *Trichodesmium* abundance and atmospheric dust deposition. The dust derives from the deserts of Africa and is the major source of iron to open ocean phytoplankton.

Her current research interests are that of iron acquisition by phytoplankton. She came to the DMC in March to pursue this research with Dr. Mark Wells.

As part of a developmental project, Karen has constructed a liposome-based nanodevice that transports iron. This device will be used to measure the biologically available iron in seawater. Karen and Mark have submitted a full grant proposal to the NSF for continued funding.

Darling Marine Center

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Walpole, ME 04573

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2003 Summer Courses

Ecology of Marine Sediments May 19-June 6

A multi-disciplinary examination of factors controlling ecological processes in marine sediments. Emphasis on recent research integrating biological, geological, and chemical aspects of marine sedimentary environments. UMaine faculty: Dr. Les Watling, Dr. Larry Mayer, Dr. Pete Jumars. UMaine accredited.

Shellfish Mariculture Techniques May 19-23

A one week residential course during which participants explore the theory and practice of marine bivalve aquaculture as practiced in the Northeastern United States. Bivalve taxonomy, anatomy, reproductive biology and genetics; algal culture; larval rearing techniques; pathology and site selection, water quality and human health issues are among the topics to be covered. Dr. Bruce Barber. UMaine accredited.



Developmental Biology Teaching Workshop

June 18-21

Developmental Biology Teaching Workshop provides hands-on experience working with organisms commonly studied in developmental biology teaching laboratories. The course is useful for new and experienced developmental biology teachers wishing to diversify their laboratory lessons. Developmental Biology Teaching Workshop is a perennial favorite at the DMC. Dr. Leland Johnson, Augustana College, SD, is the instructor.

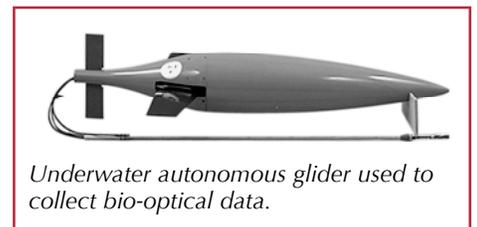
Silver Wake June 22-29

Based at the DMC, Silver Wake is an environmental education program targeted to middle school teachers. The program includes hands-on, team-oriented activities that take teachers through the steps of collecting, identifying, and understanding Gulf of Maine phytoplankton. We will explore photosynthesis, marine food chains, bioluminescence, and the ecology of phytoplankton. The focus will be on harmful algal blooms and on better understanding the linkages between phytoplankton growth and concerns regarding marine pollution, health, and local economies. For more information on Silver Wake, visit the University of Maine Cooperative Extension web site at www.ume.maine.edu/ssteward/silverwake.htm Silver Wake has its own registration process.

Spatio-Temporal Statistical Analysis of Multi-platform Ocean Optical Observations

June 23 – July 25

This is a cross-disciplinary, graduate level course combining the fields of spatial GIS and ocean optics. The major theme of this



Underwater autonomous glider used to collect bio-optical data.

course is the analysis and interpretation of bio-optical ocean data collected on a range of spatial and temporal scales by a diverse assemblage of sensors and platforms ranging from ocean color satellites to underwater autonomous gliders. UMaine accredited.

Summer course information available
www.dmc.maine.edu