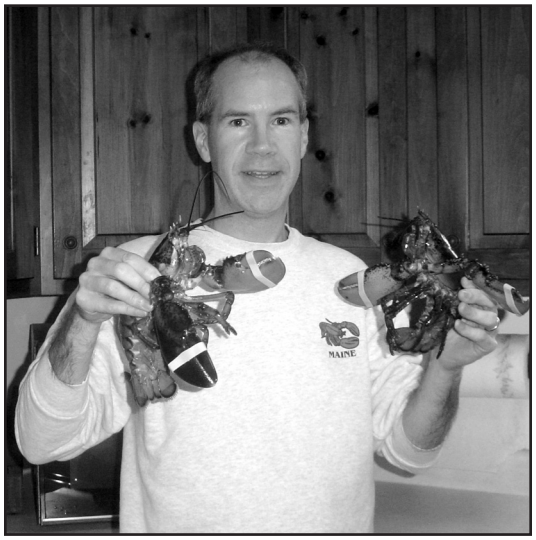
Making Waves

At the University of Maine's Darling Marine Center

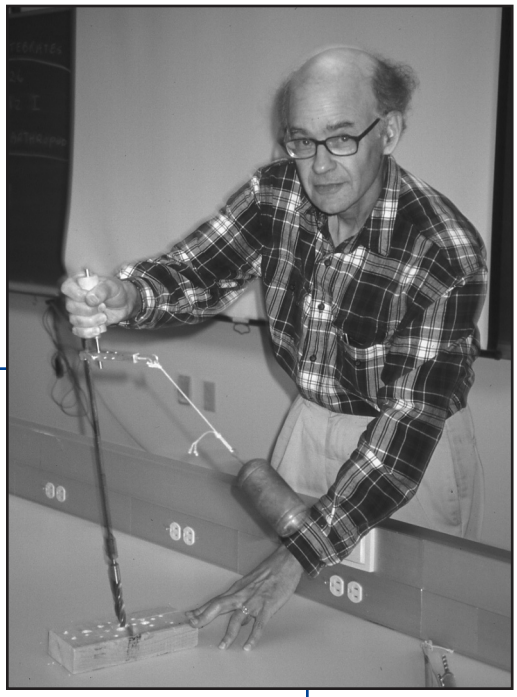
DMC Introduces Unique Programs for Visitors

The user-friendly marine laboratory in midcoast Maine introduced two unique and exciting programs in 2005. The addition of the *Visiting Scholars Program* and the *Visiting Graduate Student Program* round out the already vast program offerings at the DMC.

The *Visiting Scholars Program* was designed to make the DMC attractive to senior researchers looking for a sabbatical destination. The *Visiting Graduate Student Program* makes field research logistically and financially possible for graduate students, especially those on limited budgets. Details about these programs and our first participants are described below and on page 6.



Visiting Scholar Dr. Alexander Werth. Details about his work can be found on page 6.



Senior faculty in today's world have more practical mobility than those of twenty years ago. With portable computers, email and online journals, it is easy to travel with data and works in progress. You can retreat, detach from the day-to-day, and work on larger projects.

~Dr. Steve Vogel, DMC Visiting Scholar

Visiting Scholars Program

The DMC is the perfect sabbatical retreat. Scholars will find scenic solitude for writing manuscripts and books, a stimulating intellectual atmosphere for exploring new research directions and a first-rate marine library for research.

Selected Scholars will receive *free* furnished housing and office space for a week or the academic year. Reasonable requests for laboratory space will also be accommodated. Scholars with families are welcome.

Vogel & Werth Inaugurate Visiting Scholars Program

Dr. Steven Vogel and Dr. Alexander Werth were the first participants in the Darling Marine Center's new *Visiting Scholars Program*.

Dr. Steven Vogel, James B. Duke Professor of Biology at Duke University, holds the honor of being the DMC's first Visiting Scholar. He and his wife Jane were in residence at the DMC for six weeks this fall.

Steve has participated in similar programs at other institutions and believes they offer great opportunities for researchers on sabbatical leave. One of the benefits, he points out, is being able to set aside the politics and issues inherent with daily faculty life and really talk science with colleagues and students. Steve also notes the difference between a Visiting Scholar and a Visiting Investigator. As a Visiting Investigator there is typically a certain amount of data to collect and work to be done. As a Visiting Scholar there is time to write, reflect and pursue tangential avenues of interest.

As a form of introduction, Steve presented a five-part biomechanics seminar series. Commenting later, Steve noted that these seminars sparked not only conversation, but useful interactions with resident researchers that may well lead to a scientific paper. For Steve, even casual conversations proved to be scientific and professionally very enriching.

The new book and periodical wing of the DMC marine library measures 2,280 square feet. It includes a reading room and outside deck. Computer work stations can be found in the attached reference wing (not shown) which measures 1,196 square feet.

NSF Funds New & Improved DMC Library

It's been four years in the making, from grant writing to building to moving stacks of books and journals, but this fall the DMC proudly opened the doors to its expanded marine library. Funded by NSF's Field Station and Marine Laboratory Program, it is the only University of Maine System library devoted solely to Marine Science.

Though many of the University's marine science reference resources are housed at the Fogler Library on the Orono campus, 100 miles to the north, a significant number can be found at the DMC Library. Our collection houses over 7,000 items including 110 serial titles covering a wide area of subjects: biology, chemistry, ecology, geology, oceanography, and zoology. Approximately 40% of the serials are unique holdings within the state. The library provides access to a variety of databases including Web of Science, Aquatic Sciences & Fisheries Abstracts, Oceanic Abstracts, BIOSIS Previews, and GeoRef.

DMC Turns ... Forty-something. It's Party Time!

Forty-something? It depends on when you start counting. Ira Darling donated the property in 1965, but David Dean, the first director was hired in January 1966. Either way, it's time for a reunion celebration and everyone who has been associated with the DMC—faculty, staff, grads, SBSers, interns and visiting investigators—is invited to a party on Saturday, August 5, 2006. We will have boat rides on the R/V *Ira C.*, a dedication of the new library and, of course, a traditional Maine lobster bake. More information will be posted on the DMC website.

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

Darling Marine Center

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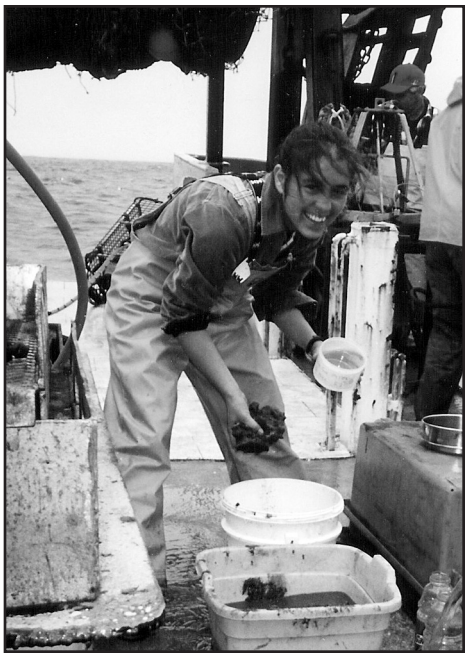


Emily Knight

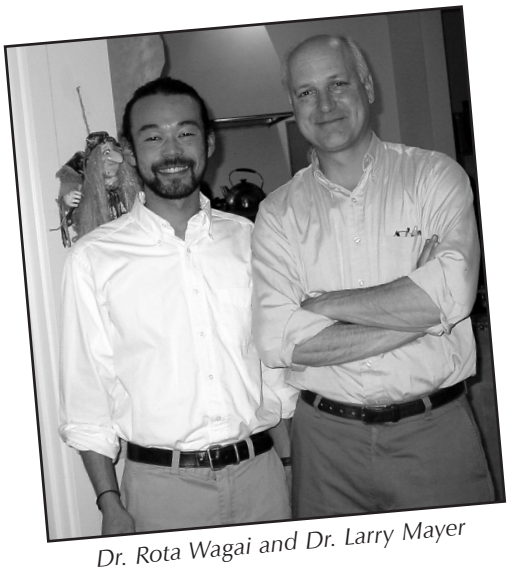
Emily Knight Receives Master's & Knauss Fellowship

Emily Knight, a graduate student with Dr. Les Watling, has been awarded a Master's degree in Oceanography and a John A. Knauss Marine Policy Fellowship for 2006.

Emily's thesis research addressed issues of bottom disturbance by mobile fishing gear and community resilience. She studied the community composition of coarse sediment habitat in trawled and untrawled areas in the Gulf of Maine and found significant differences between the two benthic communities. Trawled sites were characterized by disturbance tolerant, opportunistic families, while untrawled sites were dominated by more disturbance intolerant, sessile families.

In January, Emily moves to Washington, DC, to work on a larger range of marine-related issues as part of her Knauss Fellowship. The Knauss Fellowship is sponsored by the National Oceanic and Atmospheric Association (NOAA) and is awarded to about forty graduate students each year.

Congratulations Emily!



Dr. Rota Wagai and Dr. Larry Mayer

Rota Wagai Receives Doctorate

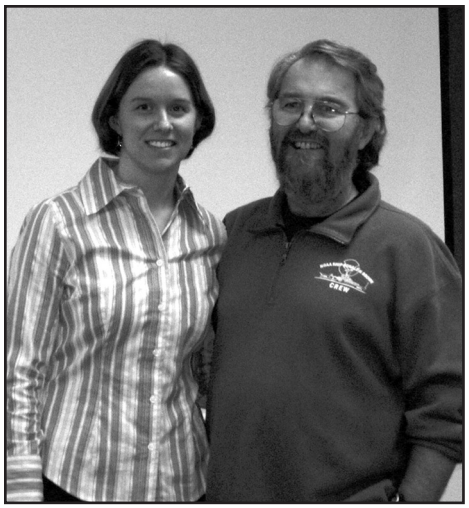
With a background in forest science and an interest in soil chemistry, Rota Wagai was not a typical marine lab student. But Rota's research, which focused on carbon cycling in the soils of Mt. Kinabalu, Borneo, dovetailed nicely with the marine sediment research of Dr. Larry Mayer, his dissertation advisor.

Rota showed that in low-altitude soils, which represent a warm climate regime, organic/mineral associations are strong and the organic matter is not readily available to microbes. Conversely, in high-altitude soils, representative of cool climate regimes, the organic/mineral associations are weak.

Rota notes that the trend itself, warm soils holding carbon and cold soils having more bioavailable carbon, is "nothing new," but his findings shed new light on the mechanics of organic/mineral association. A better understanding of these associations is essential to predict ecosystem responses to global climate change.

Rota has returned to his native Japan to work at the Center for Ecological Research, Kyoto University.

Congratulations Rota!



Betsy Grannis and Dr. Les Watling

Betsy Grannis Receives Master's

Betsy Grannis was awarded a Master's degree in Oceanography earlier this year. Working with Dr. Les Watling, she compared the impacts of laying a telecommunication cable to the effects of mobile fishing gear on the seafloor communities of mud and sand habitats.

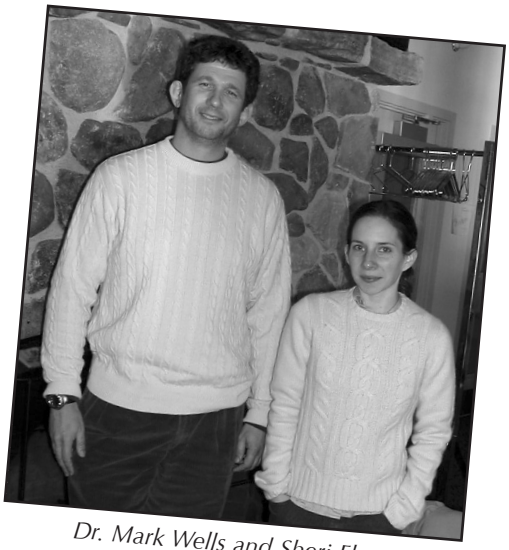
The impetus of the study was the laying of the first trans-Atlantic fiber optic telecommunication cable from Boston to Halifax to Dublin. Since a portion of the cable crossed the Stellwagen Bank National Marine Sanctuary researchers seized the opportunity to study the effects of anthropogenic disturbances.

Betsy found that the one-time disturbance of laying a cable was less disruptive to soft-bottom communities than the repeated use of mobile fishing gear.

Understanding the effects of seafloor disturbances, be they single or repeated events, is important from a biodiversity perspective, but also in terms of nutrient cycling and food web considerations. The organisms that live in and on soft sediments add considerably to the food chain that supports the commercial fisheries of Gulf of Maine.

Betsy is now teaching high school biology and chemistry at Lincoln Academy in Newcastle, ME.

Congratulations Betsy!



Dr. Mark Wells and Sheri Floge

Sheri Floge Receives Master's

Sheri Floge was awarded a Master's degree in Oceanography in 2005. Her thesis advisor was Dr. Mark Wells.

Sheri is interested in the way minute particles in seawater affect light propagation. These small particles scatter and absorb light in such a way as to obscure remote sensing data measuring chlorophyll a.

Specifically, Sheri studied the colloidal size fraction (particles < 1kDa) of colored dissolved organic matter (CDOM) She looked for patterns of abundance and spatial distribution of colloidal CDOM in coastal waters in hopes of finding a relationship between colloidal CDOM and biological and/ or terrestrial sources.

Sheri found seasonal variations of colloidal CDOM abundances that paralleled phytoplankton blooms, but found no direct correlation between colloids and chl a. She also noted that backscattering by small colloids might play a significant role in determining the optical properties of seawater.

Sheri is still at the DMC, continuing her work on various aspects of colloidal CDOM research with Mark.

Congratulations Sheri!

Dr. Mary E. Petersen

Taxonomist Joins DMC

Dr. Mary E. Petersen has returned to the USA after almost 40 years in Denmark. Until recently, Mary worked at the Zoological Museum, University of Copenhagen (ZMUC). She is now a Scholar in Residence at the DMC.

Mary's speciality is polychaete taxonomy, systematics, biology and phylogeny, mainly in the families of Pholoidae, Cirratulidae, Chaetopteridae and Fauveliopsidae. Her current work includes ongoing revisions of some "cosmopolitan, variable species" such as *Chaetopterus variopedatus* and several cirratulids, and attempting to get new information on *Pseudocirratulus kingstonensis*.

Mary is also reexamining some of the polychaete species described in *Fauna Groenlandica* (1780) by Otto Fabricius during his five-year stay in southwest Greenland as a missionary, naturalist and linguist. Many of Fabricius' species have been reported from both sides of the Atlantic and in Maine waters. Mary is working on a new English translation of Fabricius' polychaete descriptions which will include annotations and figures from unpublished 18th century works, as well as modern references, and comparisons to common Gulf of Maine species.

Kathleen Hardy

Lisa Pickell

Searching for Causes of Toxic Phytoplankton Blooms

For three weeks in September, Kathleen Hardy and Lisa Pickell conducted research aboard the R/V *Melville* as part of ECOHAB PNW, a five-year NSF/NOAA funded project studying the physiology, toxicology, ecology and oceanography of *Pseudo-nitzschia* species off the Pacific Northwest coast.

Though *Pseudo-nitzschia* produces the toxin domoic acid, not all *Pseudo-nitzschia* blooms are toxic. ECOHAB scientists are looking for environmental factors that may contribute to blooms and the production of domoic acid.

Kathleen and Lisa determined uptake rates of radioactive iron by native populations of phytoplankton with emphasis on those sites where *Pseudo-nitzschia* were present. They also looked at rates of iron uptake and chlorophyll levels (an indicator of cell biomass) in these same populations with added copper and ligands. These data when combined with domoic acid, iron and nutrient concentrations, and population composition data will possibly clarify the role of iron, copper and ligand concentrations in bloom development and toxicity.

Recent Publications

Abello, H.U., **S.M. Shellito**, **L.H. Taylor** & **P.A. Jumars**. 2005. Light-cued emergence and re-entry events in a strongly tidal estuary, Estuaries 28: 487-499.

Auster, P.J., J. Moore, K.B. Heinonen & **L. Watling**. 2005. A habitat classification scheme for seamount landscapes: assessing the functional role of deep-water corals as fish habitat. Pp. 761-769. In: Cold-Water Corals and Ecosystems. A. Freiwald & J.M. Roberts (eds.). Springer-Verlag.

Book, J.W., P. Pistek, **H.T. Perkins**, K.R. Thompson, W.J. Teague, G.A. Jacobs, M.-S. Suk, K.-I. Chang, J.-C. Lee, & B.H. Choi. 2004. Data assimilation modeling of the barotropic tide in the Korea/Tsushima Strait. J. Oceanogr. 60: 977-993.

Boudreau, B.P., I. Croudace, C. Algar, A. Reed, B.D. Johnson, **K.M. Dorgan**, **P.A. Jumars**, B.S. Gardiner & Y. Furukawa. 2005. Bubble growth and rise in sediments. Geol. 33: 517-520.

Bricelj, V.M., S.P. MacQuarrie, **B.M. Twarog** & V.L. Trainer. 2004. Characterization of Sensitivity to PSP Toxins in North American Populations of the Softshell Clam, *Mya arenaria*. In: Harmful Algae 2002. K.A. Steidinger, J.H. Landsberg, C.R. Tomas and G.A. Vargo (eds.). Florida Fish and Wildlife Conservation Commission, Florida Institute of Oceanography and IOC of UNESCO: p.172-174

Bricelj, V.M., S. MacQuarrie, **B. Twarog**, L. Connell & V. Trainer. 2004. Development of resistance to paralytic shellfish toxins in the softshell clam, *Mya arenaria*, via a single mutation in the sodium channel pore region: I. Fitness consequences of differential resistance to toxins and implications for natural selection. XIth Conference on Harmful Algal Blooms, South Africa.

Çinar, M.E., Z. Ergen, E. Dagli & **M.E. Petersen**. 2005. Alien species of polychaetes (*Streblospio gynobranchiata* and *Polydora cornuta*) in Izmir Bay, eastern Mediterranean. J. Mar. Biol. Ass. U.K. 85: 821-827.

Connell,L., **B. Twarog**, S. MacQuarrie, V.M. Bricelj & V. Trainer. 2004. Development of resistance to paralytic shellfish toxins in the softshell clam, *Mya arenaria*, via a single mutation in the sodium channel pore region: II. Molecular Identification of a mutation associated with the resistant phenotype in multiple populations. XIth Conference on Harmful Algal Blooms, South Africa.

Dorgan, K.M., **P.A. Jumars**, B. Johnson, B.P. Boudreau, & E. Landis. 2005. Burrowing by crack propagation through muddy sediment. Nature 433: 475.

Eckelbarger, K.J. 2005. Oogenesis and oocytes. In: Morphology, Molecules, Evolution and Phylogeny in Polychaeta and Related Taxa. T. Bartolomaeus and G. Purschke (eds.). Hydrobiologia 535/536: 179-198.

Eckelbarger, K.J. 2005. Oogenesis. In: Reproduction, Biology and Phylogeny of Annelida. B.G.M. Jamieson, G. Rouse and F. Pleijel (eds.). Science Publishers, NH.

Eckelbarger, K.J., **L. Watling** & **H. Fournier**. 2005. Reproductive biology of the deep-sea polychaete *Gorgoniapolynoe caeciliae* (Polynoidae), a commensal species associated with octocorals. J. Mar. Biol. Ass. U.K. 85: 1425-1433.

Halt, M.N., G.W. Rouse, **M.E. Petersen** & F. Pleijel. 2005. Cirratuliformia. In: Reproduction, Biology and Phylogeny of Annelida. B.G.M. Jamieson, G. Rouse and F. Pleijel (eds.). Science Publishers, NH.

Helmut, L., **L. Watling** & R. Stone. 2005. *Cladorhiza corona sp.nov.* (Porifera: Demosponfiae: Cladorhizidae) from the Aleuttian Islands (Alaska). J. Mar. Biol. Ass. U.K. 85: 5052/1-8.

Hughes, T.P., D.R. Bellwood, C. Folke, **R.S. Steneck** & J.E. Wilson. 2005. New paradigms for supporting resilience of marine ecosystems. Trends in Ecology & Evolution 20: 380-386.

Kim, K., S.J. Lyu, Y.-G. Kim, B.-H. Choi, K. Taira, **H.T. Perkins**, W. J. Teague & J. W. Book. 2004. Monitoring volume transport through measurement of cable voltage across the Korea Strait. J. Atmos. and Ocean. Tech. 21(4): 671-682.

Lee, C.M., F. Askari, J. Book, S. Carniel, B. Cushman-Roisin, C. Dorman, J. Doyle, P. Flament, C.K. Harris, B.H. Jones, M. Kuzmic, P. Martin, A. Ogston, M. Orlic, **H. Perkins**, P. Poulain, J. Pullen, A. Russo, C. Sherwood, R.P. Signell & D. Thaler. 2005. Transport pathways of the Adriatic: Multi-disciplinary perspectives on a wintertime Bora wind event. EOS Transactions. American Geophysical Union 86(16): 157,163,165.

Mayer, L.M., 2004. The inertness of being organic. Marine Chemistry 92: 135-140.

Mazard, S.L., N.J. Fuller, **K.M. Orcutt**, O. Bridle & D. J. Scanlan. 2004. PCR Analysis of the Distribution of Unicellular Cyanobacterial Diazotrophs in the Arabian Sea. Applied and Environmental Micobiology 70(12): 7355-7364.

Petersen, M.E. 2005. Some new Fauveliopsidae (Annelida: Polychaeta) from the Faroe Islands, with a review of the family's biology and its distribution in the Northeastern Atlantic. Pp. 251-252 in BIOFAR Proceedings 2005, BIOFAR Symposium, Tórshavn 24-26 April 2003. North-East Atlantic marine benthic organisms in the Faroes – taxonomy, distribution and ecology. A. Nørrevang, D. Bloch and O.S. Tendal (eds.). Ann. Soc. Sci. Færoensis Suppl. 41. Tórshavn, Faroes (Abstract).

Ray, J.C., K.H. Redford, J. Berger & **R.S. Steneck**. 2005. Is large carnivore conservation equivalent to biodiversity conservation and how can we achieve both? In: Large Carnivores and the conservation of biodiversity. J. Ray, K. Redford, R. Steneck, and J. Berger (eds.). Island Press. Pages 400-428.

Sale, P.F., R.K. Cowen, B.S. Danilowicz, G.P. Jone, J.P. Kritzer, K.C. Lindeman, S. Planes, N.V.C. Polunin, G.R. Russ, Y. J. Sadovy & **R.S. Steneck**. 2005. Critical science gaps impede use of no-take fishery reserves. Trends in Ecology and Evolution 20: 74-80.

Shan, G., S.K. Embrey, R.A. Herman, J. Wolt, D. Weston, & **L.M. Mayer**. 2005. Biomimetic extraction of *Bacillus thuringiensis* insecticidal crystal proteins from soil based on invertebrate gut fluid chemistry. Journal of Agricultural and Food Chemistry 53: 6630-6634.

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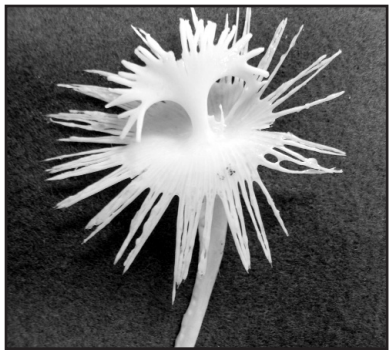


New Species Described

During the summer of 2004, Dr. Les Watling and other scientists aboard the R/V *Roger Revelle* discovered a new species of predatory sponge off the Aleutian Islands: *Cladorhiza corona* sp.nov.

Cladorhiza corona (left), is pale yellow and was seen living on hard substrates at depths of 726-2,077 meters. The species appears to be a predator, feeding primarily on calanoid copepods.

The holotype was collected with the ROV *Jason II* at a depth of 1,011 meters. It measures 32.5 cm in total length, the stalk is .6 to .9 cm in diameter, and the circular crown is about 8.5 cm in diameter.

Precambrian Clay Production leads to O_2 Accumulation

Larry Mayer has been taking old findings from the DMC's mudflat, Lowes Cove, out for a spin. From a 1970's project on clam-digging that he did with Les Watling came an interest in the grain size dependence of organic matter in sediments. He expanded themes from that work into the Gulf of Maine, and thence out to sediments from all over the world's oceans. The latest expansion goes back in time, testing the hypothesis that increased production of clays 500–800 million years ago made possible organic matter burial that then resulted in oxygen accumulation in the atmosphere. Results so far, from sampling late Precambrian rocks worldwide, support the hypothesis, shedding light on the evolution of the invertebrate animals that instigated the original studies in Lowes Cove. That which goes around…

Dr. Larry Mayer reaches for a Precambrian rock in Norway.

A Collaborative Effort in Nanotechnology

Dr. Kjell Gundersen & Dr. Karen Orcutt

Drs. Karen Orcutt and Mark Wells, University of Maine, and Drs. Kjell Gundersen and Michael Sieracki, Bigelow Laboratory for Ocean Sciences, are applying nanotechnology to questions of biological oceanography. Nanocrystals (or quantum dots) have unique fluorescence properties that provide a tremendous potential for probing structure and function in single celled organisms.

The researchers plan to attach nanocrystals to membrane-bound proteins to study nutrient stress and uptake by phytoplankton cells. This novel approach may improve established methods of bio-imaging in marine science and serve as a proxy test for the use of nanocrystals with other cellular probes.

Visiting Scholars

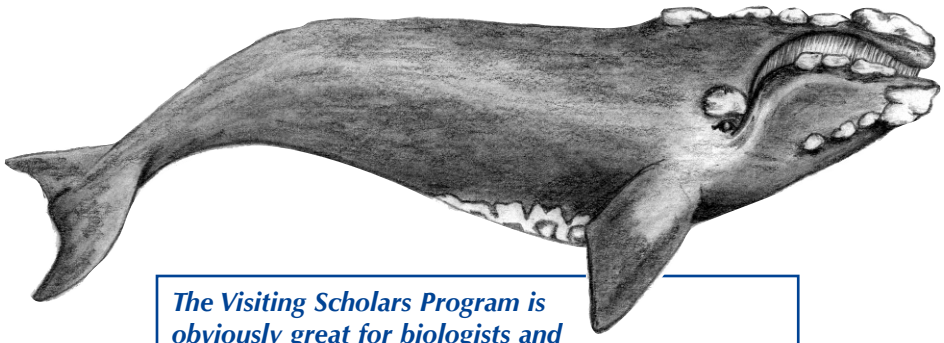
Visiting Scholars, *continued from page 1*

Dr. Alexander Werth, Elliott Professor of Biology at Hampden-Sydney College, VA, chose to spend the first half of an exciting sabbatical year as a Visiting Scholar. He and his family are in residence at the DMC for the fall semester and will travel to the Republic of Maldives in the Indian Ocean on a Fulbright Award for the second semester.

Alex defines himself as an evolutionary biologist/morphologist. His research interests include the functional morphology of whales, especially their feeding mechanisms. Alex's research has taken him around the world, introduced him to a number of cultures, and fostered two other interests: marine conservation, specifically in light of cultural differences, and teleology.

Writing, collaborating and exploring facets of marine environmental education are three aspects of Alex's sabbatical leave. The DMC offered just what he needed: writing space and close proximity to colleagues at the Woods Hole Oceanographic Institution, the New England Aquarium and the Provincetown Center for Coastal Studies.

Alex and family have become a welcome addition to the DMC community. Alex presented a seminar series on his research on cetacean morphology and research, and conducted whale programs for elementary school groups participating in the Gulf of Maine Foundation K-12 program.



The Visiting Scholars Program is obviously great for biologists and marine related researchers, but chemists, physicists and other researchers would thrive here as well. It's a great place.

~Dr. Alexander Werth, DMC Visiting Scholar

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.

Recent Publications, ***continued from page 5***

Sherwood, C.R., J.W. Book, S. Carniel, L. Cavaleri, J. Chiggiato, H. Das, J.D. Doyle, C.K. Harris, A.W. Niedoroda, **H. Perkins**, P.-M. Poulain, J. Pullen, C.W. Reed, A. Russo, M. Sclavo, R.P. Signell, P. Traykovski, & J.C. Warner. 2004. Sediment dynamics in the Adriatic Sea investigated with coupled models. Oceanography, 17(4):58-69. (See corrections:18(1):4.)

Steneck, R.S. 2005. Are we overfishing the American lobster? Some biological perspectives. Chapter 8, pages 127-143. In: The Decline of Fisheries Resources in New England: Evaluating the Impact of Overfishing, Contamination, and Habitat Degradation. R. Buchsbaum, W. E. Robinson, J. Pederson (eds.). MIT Sea Grant College Program, Cambridge, MA, no: 04-7.

Steneck, R.S. & E.A. Sala. 2005. Large marine carnivores: trophic cascades and top-down controls in coastal ecosystems past and present. In: Large Carnivores and the conservation of biodiversity. J. Ray, K. Redford, R. Steneck, and J. Berger (eds.). Island Press. Pages 110-137.

Taylor, L.H., **S.M. Shellito**, **H.U. Abello** & **P.A. Jumars**. 2005. Tidally cued emergence events in a strongly tidal estuary. Estuaries 28: 500-509.

Voparil, I.M., R.M. Burgess, **L.M. Mayer**, R. Tien, M.G. Cantwell, & S.A. Ryba. 2004. Digestive bioavailability to a deposit feeder (*Arenicola marina*) of PAH associated with anthropogenic particles. Environmental Toxicology and Chemistry 23: 2618-2626.

Watling, L. & P.J. Auster. 2005. Distribution of deep-water Alcyonacea off the Northeast coast of the United States. Pp. 279-296. In: Cold-Water Corals and Ecosystems. A. Freiwald & J.M. Roberts (eds.). Springer-Verlag.

Wildish, D.J., J.E. Hughes-Clarke, G.W. Pohle, B.T. Hargrave, & **L.M. Mayer**. 2004. Acoustic detection of organic enrichment in sediments near salmon farms in the Bay of Fundy, Canada. Mar. Ecol. Prog. Ser. 267: 99-105.

Visiting Graduate Student Awards

In the spirit of Addison E. Verrill and Henry Bryan Bigelow, two great researchers in marine biology and oceanography, the DMC now offers in-kind awards that make field research logistically and financially possible for graduate students. The awards provide up to $3,400 worth of housing, lab space, microscope use, boat time and SCUBA support to qualified graduate students. Becca Kordas and Eric Rehm were the first recipients of the new awards.

Becca Kordas received the *Addison E. Verrill Award for Marine Biology*. She is a Master's student at California State University, Northridge, working with Dr. Steve Dudgeon. Though based in California, Becca is studying the timing of barnacle (*Semibalanus balanoides*) and rockweed (*Ascophylum nodosum*) settlement along a latitudinal gradient from Gloucester, MA to Quoddy Head, ME. She is testing the hypothesis that the early settlement of barnacles in the south provides substrate heterogeneity that serves as a refuge for rockweed germlings, and the later settlement of barnacles in the north smother the rockweed germlings.

The DMC was a convenient home base for Becca in the early spring and late summer when she set and collected settlement tiles at her test sites. Becca also held her tiles in seawater aquaria and processed samples in the flowing seawater laboratory.

Visiting Graduate Student Becca Kordas

Visiting Graduate Student Awards

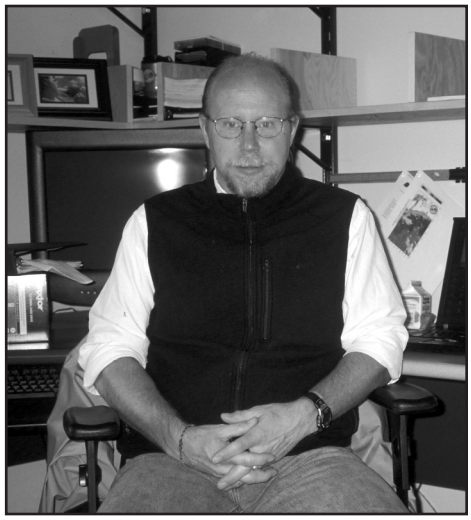
Graduate students looking to collect samples or conduct experiments at a world class marine laboratory can now apply for the Visiting Graduate Student Awards.

In the spirit of Addison E. Verrill and Henry Bryan Bigelow the DMC awards qualified graduate students with up to $3,400 of facility use and services required to conduct the project. Facility use includes: housing and lab space for up to three months, boat rental, flowing seawater aquaria and SCUBA support.

Eligible students must be currently enrolled in a graduate program. Preference will be 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

Applications will be reviewed by a committee of resident faculty. The deadline for applications is February 15, 2006. Selected students will be notified by March 15, 2006.



Visiting Graduate Student Eric Rehm

As a physical oceanography graduate student who has chosen an interdisciplinary path of study involving ocean physics, biology and optics, Darling Marine Center represents a "sweet spot" laboratory for the advancement of my research goals.

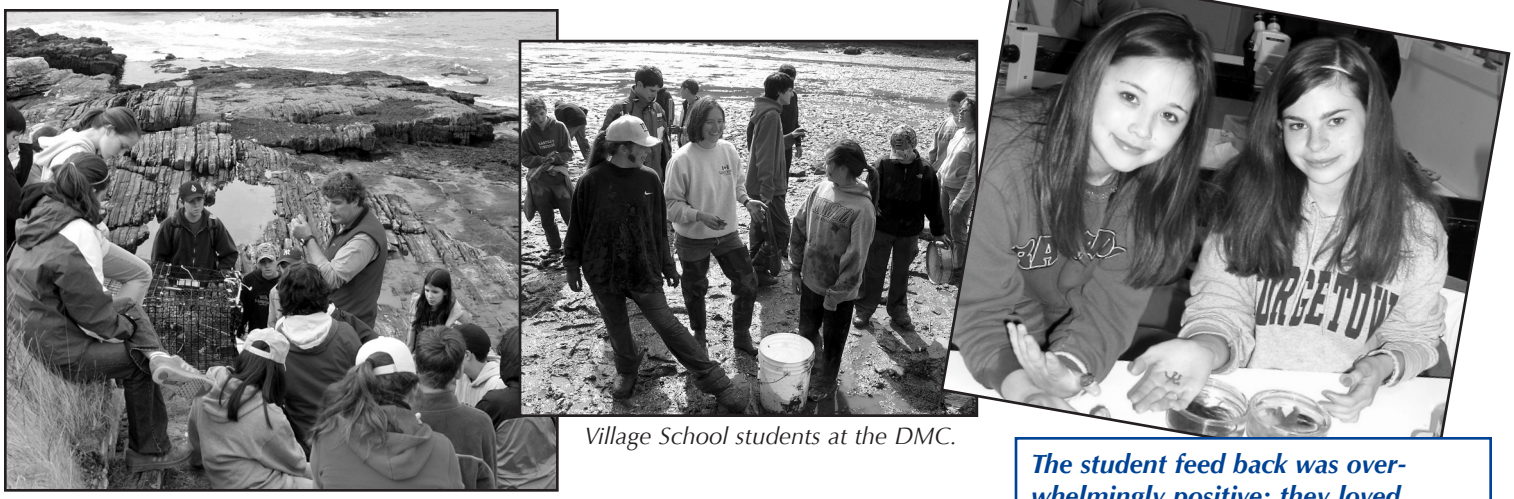
~Eric Rehm, Recipient
Henry Bryant Bigelow Award

Eric Rehm received the *Henry Bryant Bigelow Award for Oceanography*. He is a graduate student at the University of Washington Applied Physical Laboratory working with Dr. Eric D'Asaro and studying phytoplankton community composition, growth rates and primary productivity using some of the newest fluorescence sensors and remote sensing techniques.

Eric is no stranger to the DMC. He participated in the Ocean Optics class in 2004 and has kept in contact with Dr. Mary Jane Perry, one of the instructors of the course. He planned to return to the DMC in the summer of 2005 to work in Mary Jane's optical oceanography lab and to participate in one of her cruises.

In addition to collaborating on projects in the Perry lab, Eric also wanted to further his own thesis research. The Bigelow Award enabled him to do just that. It provided extra ship time that allowed Eric to make specific measurements of phytoplankton fluorescence with newly available fluorescence sensors and to make in-water measurements of apparent and inherent optical properties of water, both in the estuary and offshore.

Visiting Colleges & Schools



Village School students at the DMC.

Through word of mouth, Dadmara De Santis, teacher and Associate Director of the Village School for Children in Waldwick, NJ, heard rave reviews about the Visiting College & University Program and asked if we would be willing to host her middle school students. Naturally, we said "yes."

So this spring, the 7th/8th grade biology class from the Village School visited the DMC for a 3-day field trip. Prior to their visit, students washed cars and sold baked goods to raise the necessary funds. They also studied hard and were academically well prepared for the intensive field work at the lab.

The students, many of whom had never visited the Maine coast, explored the rocky intertidal and the mudflats. They also participated on a research cruise and had a plankton workshop with Professor Emeritus, Dr. Bernie McAlice.

The student feed back was overwhelmingly positive; they loved everything about the field trip. The rocky intertidal walk and the boat ride were, of course, highlights of the trip for them, due to the adventurous nature of these experiences, but they really found all the programs interesting and fun. It was as nearly perfect a trip as I could have hoped for.

~Dadmara De Santis,
The Village School for Children,
Waldwick, NJ

Visiting College 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. We can customize your visit to fit your curriculum and arrange lecture and laboratory assistance, too. The following institutions have participated in the Visiting College and University Program:

Amherst College, MA
Baldwin Wallace University, 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 University, PA
Fairleigh-Dickenson University, NJ
George Washington University, 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
University of Pennsylvania, PA
University of South Alabama, AB
Villanova University, PA
Wayne State College, NE
Westfield State College, MA
Yesheva University, NY

South Bristol Kids donate to GMF

Last March, the Gulf of Maine Foundation (GMF) received a very special response to their annual appeal. The donation came from Kelsey and Cassie Leeman, students at the South Bristol School (South Bristol, ME) who participated in GMF's K-12 marine science program.

Kelsey and Cassie raised nearly $100 in coins and small bills from fellow students and presented the donation to GMF President Stephen Busch and Education Coordinator Jan Faulkner. The donation came with a note expressing how much they enjoyed GMF's marine eduction program.

When I think back on that, wow, I get goose bumps all over again, I was so touched and impressed.

~Stephen Busch, President GMF

Myers Fund Grants GMF $1,000

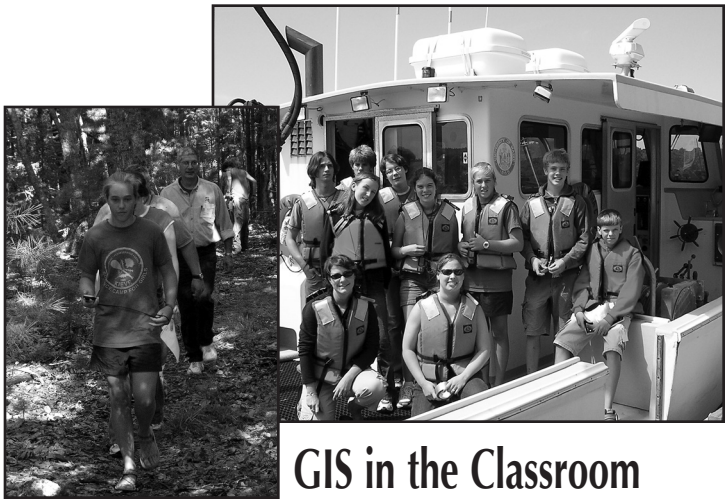
On behalf of the Gulf of Maine Foundation, Stephen Bush accepted a $1,000 award from the Edward A. Myers Conservation Fund. The award was presented at the Pemaquid Oyster Festival in Damariscotta, Maine.

The Oyster Festival is an annual event in our local area and the primary fund raiser for the Edward A. Myers Conservation Fund. GMF was one of several local conservation and educational organizations to receive awards from the Fund in 2004 and 2005.

NSF GK-12 Brings Maine students to DMC

DMC graduate student Brandon Sackmann brought a new dimension of scientific inquiry to Cindy Moran's 8th grade science classes at the Wagner Middle School, Winterport, Maine. Their curriculum focused on sound and optics, and on ecology. Since optical oceanography is Brandon's field of research, his pairing as an NSF GK-12 fellow with these students was perfect.

Just before the school year ended, Brandon arranged a field trip to the DMC for the three classes, about 60 students in total. The field trip gave the students a chance to see marine research in action, and to learn about marine ecology. Brandon felt the time spent at the lab helped reinforce the concepts he had been talking about in class with respect to phytoplankton and marine food webs.

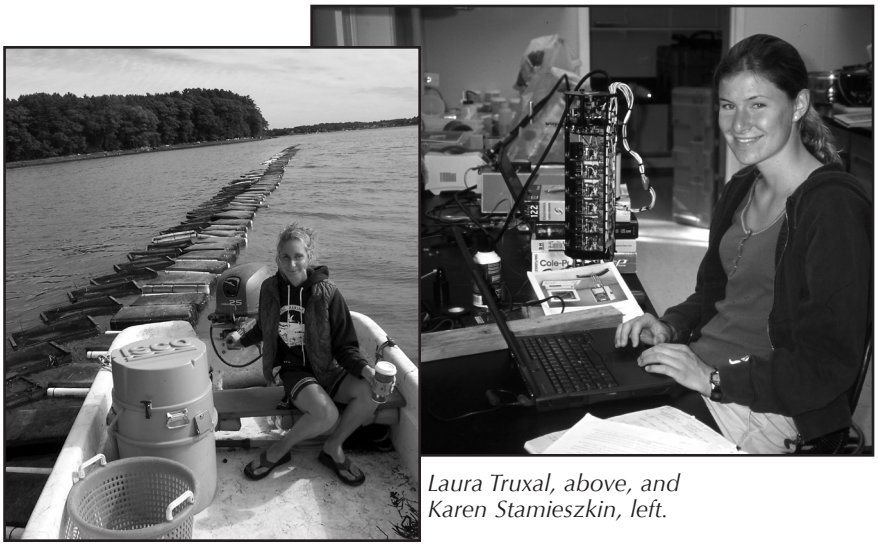


GIS in the Classroom

In mid-August, 30 students and teachers from six coastal and island high schools in Maine convened at the DMC to learn about GIS technology and its many applications. They hiked through the woods mapping DMC trails and coastline. Aboard the R/V *Ira C.*, they followed drogues on the Damariscotta River to learn about tides and currents.

With support from the Jessie B. Cox Foundation, the Island Institute organized the workshop which provided training in GIS technology, place-based education, and tools on how to combine both in the classroom.

Undergraduate Science



Laura Truxal, above, and Karen Stamieszkin, left.

Summer Internships

With more than 30 students in residence, the DMC's summer undergraduate internship program is among the largest of east coast marine labs. Funding for the internships comes from National Science Foundation's Research Experiences for Undergraduates (REU) program, the Gulf of Maine Foundation and individual faculty research grants. To the right is a sampling of the undergraduate research accomplished at the DMC this summer. Full abstracts are on line at www.dmc.maine.edu

It was wonderful and enlightening to see such a diverse group of people working on projects that ranged from molecular biology to geographic information systems. The positive effects of the program will, no doubt, continue to influence my life for years to come.

~Daniel Agro, University of Southern Maine

2005 marked the DMC's 6th year of participation in the REU program.

Dan Agro, University of Southern Maine
The Predictive Possibilities of a Marine GIS: Developing the architecture for a predictive habitat suitability model for Alcyonaceans in the US Eastern EEZ. Advisor: Dr. Les Watling

Anne Barrett, University of Maine.
Creating Multimedia Products for Educational Use and the Internet. Advisor: Dr. Warren Riess

Tess Geers, Hampshire College
Seamounts and Deep-water Corals of the North Atlantic Ocean: A GIS map and database. Advisor: Dr. Les Watling

Brooke Halgren, University of Maine
Taxonomy of the Cold-Water Octocoral Genus Iridogorgia. Advisor: Dr. Les Watling

Sara Matthews, Wittenberg College.
Reproductive Biology of the Deep-Sea Octocoral, *Thouarella superba*. Advisor: Dr. Kevin Eckelbarger

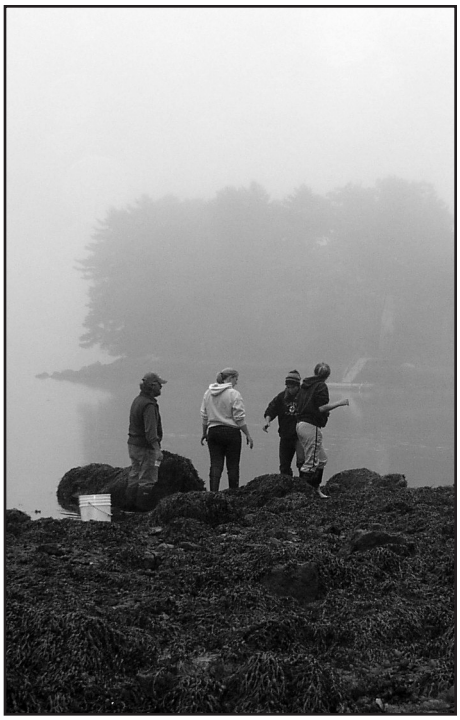
Kristy Podelnyk, University of Maine
Analysis of BMS and OMP forms of coxL show genetic variation in *Bradyrhizobium japonicum* strains associated with lupine nodules. Advisor: Dr. Gary King

Sarah Rathbone, Bryn Mawr College
The Reproductive Biology of Skeleton Shrimp, *Aeginina longicornis*. Advisor: Dr. Kevin Eckelbarger

Amanda Satterfield, Lyon College
The Effects of Iron and Copper on the Growth of Marine Phytoplankton. Advisor: Dr. Mark Wells

Laura Truxal, Texas A&M University
An analysis of emerging benthic organisms using various orientations of TAPS. Advisor: Dr. Pete Jumars

Christina Wendel, Susquehanna University
Great Salt Bay Sediment Study. Advisor: Dr. Larry Mayer



Semester by the Sea

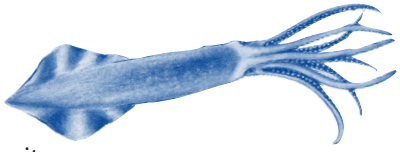
The University of Maine's School of Marine Sciences' Semester by the Sea (SBS) program offers juniors and seniors from UMaine and other academic institutions a chance to explore the disciplines of marine science in a high tech and high expectation environment. In addition to course work, some SBSers fulfill independent research requirements while in residence a the DMC.

SBSer Bill Ryerson

SBSer Bill Ryerson is a senior from Hawthorne, NJ, participating in UMaine's Honors College Program. As part of this program Bill has to complete an independent research project and defend it at the end of the year.

While in residence at the DMC, Bill has delved into histological research on *Epizoanthis sp*., a zoanthid that is found on deep sea octocorals of the genus *Paragorgia*. Working with Dr. Kevin Eckelbarger, Bill will use basic light histology techniques to identify the zoanthid, describe its morphology and reproductive ecology, and to determine whether of not the zoanthid is parasitizing the coral.

The Squid Squad



Dr. Joseph Thompson, St. Joseph's University in Philadelphia, PA, was a Visiting Investigator at the DMC this summer. Joe's research focuses on the ontogeny of jet locomotion in squid.

Though little squid look like big squid, they are very different at the cellular level. Their muscles and connective tissues change significantly during growth. The result of these changes can be seen in the ability and efficiency of the squid's jet locomotion.

To learn more about these changes, Joe and his team of two undergraduate interns and one graduate student used high speed digital video to investigate the kinematics of escape jet locomotion and digital particle image velocimetry to directly measure the propulsion efficiency of jetting. This data combined with histological studies show how and why squid locomotion changes with age and development.

The Squid Squad (left to right) Jack Szczepanski, Lisa Crescenti, Josh Brody and Dr. Joe Thompson.

Working at the DMC was great! Keeping squid in flowing seawater aquaria rather than in recirculating artificial seawater aquaria, extended their life span of and gave my team more time to work with the animals. It was a very productive summer. We will be back in 2006!

~Dr. Joseph Thompson, St. Joseph's University

Research Experience for Teachers: Studying Life in a Viscous World

NSF Research Experience for Teachers 2005

A low-Reynolds number describes a fluid environment characterized by high viscosity. It is the paradigm a diatom in the ocean represents; a world akin to us moving through molasses.

This summer six high school teachers from across Maine worked in Dr. Pete Jumars' lab where studying the realm of low-Reynolds numbers is a primary research directive. The teachers used computer models, digital photography and scale models to study the physics of life in this environment. Additional, on-site, research support was provided by SMS professor Dr. Lee-Karp Boss.

The teachers were participants in the NSF's Research Experiences for Teachers (RET). The RET program gets high school teachers back in the lab and involved in current research. The idea is that their enthusiasm for current research will filter through their classroom curriculum and strengthen their teaching.

Developmental Biology Teaching Workshop

The Developmental Biology Teaching Workshop is the longest running and most popular summer offering at the DMC.

Taught by Dr. Leland Johnson, Augustana College, SD, and Dr. Eric Cole, St. Olaf College, MN, the workshop prepares new college-level instructors of Developmental Biology for the work ahead and offers seasoned instructors new insight and techniques. Leland and Eric offer their skills and experience in such topics as: classical microsurgical techniques, fluorescence microscopy and applications of reporter gene technology.

Next summer, Dev. Bio. will be offered June 27-30, 2006. Registration information is available online at www.dmc.maine.edu/courses.html.

Developmental Biology Teaching Workshop 2005

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Making Waves
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Darling Marine Center
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The University of Maine
193 Clark's Cove Road
Walpole, ME 04573

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2006 Courses, Workshops & Special Events

Shellfish Mariculture Techniques • May 22 – 26.
A one week course exploring 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.

Developmental Biology Teaching Workshop • June 27 – 30.
Get hands-on experience working with organisms commonly studied in developmental biology teaching laboratories. This course is for new and experienced college-level developmental biology teachers wishing to diversify their laboratory lessons. Work will include teaching lab applications using sea urchins and sand dollars, chick embryos, protists, Hydra, planaria, fresh water oligochaetes, ferns, and flowering plants.

Teaching Science by Ocean Inquiry • July 16 – 22.
During this five-day workshop, high school physics teachers will team up with research scientists to develop effective ocean sciences programs that build on existing resources and promote ocean education as an interdisciplinary vehicle for enhancing science literacy. NSF funded collaboration between UMaine, Bigelow Laboratory for Ocean Sciences, and UNH.

DMC 40th Anniversary Celebration • Saturday, August 5 • see page 2

Polychaete researchers will want to mark their calendars for the week of August 12, 2007 when the 9th International Polychaete Conference will convene at the Holiday Inn By the Bay in Portland, Maine. The DMC will host the event and we all look forward to seeing you there.

Portland has long been a the hub of maritime activity in coastal Maine. Today, the city boasts a working waterfront, a vibrant arts district and a historic shopping area full of galleries, boutiques and eateries.

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

As this newsletter goes to press, additional programs are being developed for 2006.
See our website for course descriptions, information and applications: www.dmc.maine.edu.

The DMC will be at the 2006 SICB meeting in Orlando.
Stop by our booth to learn more about our great visitor programs!