

Marine Sciences Research Center



N E W S L E T T E R

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50% recycled materials.

J. R. Schubel, Director of MSRC (L); Provost Tilden Edelstein; and ITPA head, Marvin Geller examine plans for moving atmospheric sciences group to MSRC.



Institute Joins MSRC for Oceans and Atmosphere Union

Provost Tilden Edelstein announced in January the transfer to MSRC of the University's Institute for Terrestrial and Planetary Atmospheres and all of the atmospheric sciences faculty, currently in the College of Engineering and Applied Sciences. "This action represents a continuing commitment by the University to expand and enhance our programs in environmental studies," said Edelstein.

The decision is consistent with the administration's plans to assign the leadership role for further development of the University's environmental research, education, and service programs to MSRC. With atmospheric and marine sciences combined, Stony Brook will be able to make even greater contributions to understanding how society is affecting the climate of the planet. ■



MSRC's Robert Cerrato Aids Westinghouse First Prize Winner

"I was seeing things and I didn't know what it meant," commented Kurt Thorn, referring to the nascent days of his first-place winning science project in the national Westinghouse competition. He originally planned to compare trace elements in scallop shells from both polluted and non-polluted waters, since the concentration of elements taken up in shells is proportional to their concentration in water.

"I started with scallops, but didn't know how to work with them," said the senior from Shoreham-Wading River High School. Thorn's experiment called for using Brookhaven National Laboratory's synchrotron X-ray fluorescence microprobe to assay very small concentrations (1-2 parts per million) of elements such as calcium and iron in shells.

Eventually Thorn was led to MSRC Assistant Professor Robert Cerrato, who steered him to hard

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clams (*Mercenaria mercenaria*) for the study he had in mind.

Clams, unlike scallops, have well-defined, internal daily growth patterns, which would allow Thorn to date when variations in concentrations occurred. Cerrato instructed him about the growth patterns and other microstructures of the shell, so he could choose the best parts of the shell to assay.

In bivalve shells, certain elements are found in one part of the shell but not in another. Through his probe, for example, Thorn found that iron was less concentrated in the protein-rich lines between daily increments of the shell. This reflects, in part, how well the elements adsorbed onto or were incorporated into various types of shell structure.

Cerrato served as his consultant throughout the project, according to Thorn, helping him to modify his original question and giving him advice on the technical aspects and analysis of the data, as well as showing him how to conduct a computerized literature search in MSRC's reference room.

The results of Thorn's work, captured in colored photos of cross-sectioned shells magnified by microscope and graphs and charts of elements, are carefully arranged on his display poster. The poster had another showing at the March 10 Long Island Science and Engineering Fair held at the University at Stony Brook. Finalists from this judging will go to the 43rd International Science and Engineering Fair to be held in Nashville in May.

Thorn, a very unassuming 16-year-old, seemed astonished at his success. "When Bob helped me interpret the data and saw my results, he was very excited and encouraged me to publish," said Thorn.

The practical fruits of his research are still to come when, as projected by Cerrato, the methodology might be adapted to assaying and dating shells for changes in pollutant levels—providing a tool for monitoring coastal marine pollution. ■

OPS Students Show West Meadow Study Results to Nearly 100 Community and Scientists

A fall course at MSRC, *Oceanographic Problem Solving (OPS)*, is a traditional training ground for students to tackle a real marine-related problem and, working together as a group, to find causes and suggest solutions to resolve the problem. This requires an interdisciplinary approach that draws upon their skills in all the oceanographic disciplines—geological, biological, chemical, and physical.

In the past, the OPS group has examined potential effects of pier construction in Flax Pond and sewage discharge to Port Jefferson Harbor. This past fall, the OPS course's 22 students, took on the impacts of pollutant loading at a local wetlands, studying a tidal estuary of Long Island Sound (West Meadow Creek) with a diversity of tidal flushing capabilities.

The students charted the circulation, transport, and distribution of bacteria, nutrients, heavy metals, and other potential contaminants. They determined

that the pollution loading was from sources such as storm drain release, septic tank leaching from homes, and runoff from such sources as a horse farm and wildlife sanctuary.

The course culminated in a public meeting to summarize the students' findings. Taking turns at the podium, the students flipped through slides and overhead transparencies of graphs, charts, and stores of data. Looking on with their own sets of notes for final grading were the course leaders, chemical oceanographers Cindy Lee and Marie de Angelis, and geological oceanographer Charles Nittrouer.

The meeting attracted an audience of 95, some of whom, like the citizens from the community involved in the investigation, asked concerned questions and expressed their gratitude at having the study done. A semester-long project such as this one done by outside consultants would have cost the community a large sum.

Others who came to learn included agency heads from Suffolk County Department of Health Services and New York Department of Environmental Conservation, and scientists from other institutes and University departments. ■



Vincent Breslin of MSRC's Waste Management Institute with Rachel Katz, one of four finalists in the LI Science and Engineering Fair competition. Her project on degradable plastics, aided by Breslin, will next go to the international competition in Memphis.

Video, "Alive in an Urban Harbor" to be Aired on TV April 3

The educational video program, "Alive in an Urban Harbor," will have its premiere broadcast on April 3, at 7 p.m. on WLJW/Channel 21. The video, produced by MSRC in collaboration with John J. Stevens Productions, inc., examines the survival, and in some cases, the recovery of the harbor's ecosystem after decades of environmental abuse. A panel discussion will follow the half-hour film.

MSRC provided scientific advice and guidance for the production, as well as partial financial support through its Institute for Urban Ports and Harbors. The US Environmental Protection Agency sponsored the project, part of the NY-NJ Harbor Estuary Program. ■

titled, "Coupling of physical and biological processes: zooplankton." She also presented a poster on her work with MSRC colleague **Elizabeth Cosper** titled, "The ecological consequences of a picoplankton bloom to zooplankton." Lonsdale's student **Woong-Seo Kim** gave a poster on his work with Lonsdale, "Top-down control by gelatinous predators in Long Island coastal embayments."

Sigrun Jonasdottir, another Lonsdale student, gave an oral presentation on her work, "Quality of food and egg production of the copepod *Acartia tonsa*: laboratory observations." Student **Sanjay Gupta** also gave an oral presentation on his work with Lonsdale and MSRC's physical oceanographer **Dong-Ping Wang** entitled, "A numerical model to simulate the effects of tidal mixing on *Scottolana canadensis* in the Saco River estuary, Maine."

Geological oceanographer **Charles Nittrouer**, together with graduate student **Mead Allison** and their Brazilian colleagues, received a National Geographic Society grant titled, "Geologic history of Amazon River sedimentation, Amapa coastal plain."

Nittrouer was invited to talk on marine sedimentation near the mouths of large rivers by Cornell University's department of geological sciences on February 18. He also attended the council meeting of the Oceanography Society in January; the Steering Committee meetings of Coastal Ocean Processes in San Francisco in December and New Orleans in January; and the UNOLS council meeting at Texas A & M in College Station in February.

Chemical oceanographer **Mary Scranton** chaired an American Geological Union's Ocean Sciences Meeting session, "Variability in anoxic systems." At the same meeting, held in New Orleans in January, Scranton's graduate student **Xiao-hua Yang** presented a talk coauthored by Scranton and P.L. Donaghay on "Seasonal and diel

variations in abundance and heterotrophic utilization of methylamines in short chain fatty acids in an oxic/anoxic water column."

At the February Santa Fe meeting of the American Society of Limnology and Oceanography, Scranton presented an invited talk, "Fluxes of methane in an anoxic estuarine basin." The talk was part of a session, "Fluxes of radiatively important gases." At the same meeting, Coastal Marine Scholar **Marie de Angelis** and **Scranton** presented a poster on "seasonal controls on the fate of methane in the Hudson River."

Biological oceanographer **Gordon Taylor** has just been awarded a grant on his proposal to Long Island Lighting Company for the Long Island Energy Research and Development Initiative Program. His grant proposal is titled, "Environmentally safe countermeasures to biofouling of water intake systems and heat exchangers." Biofouling is the attachment and accumulation of microscopic and macroscopic organisms on surfaces (see Focus on Research, Vol. 2, No.6, Summer 1991).

Biological oceanographer **Jon Zehr** has recently been awarded a three-year renewal by the National Science Foundation for his work on the molecular biology of the marine cyanobacterium *Trichodesmium*, which is capable of fixing nitrogen. Zehr's research program, which initially focused on *Trichodesmium* nitrogen fixation genes, is now expanding to look at the genetic diversity of natural populations, molecular properties of nitrogenase and the response to oxygen stress, and its susceptibility to marine cyanophages.

Dr. Kaori Ohki of the National Institute for Basic Biology, Okasaki, Japan, visited Zehr at MSRC in early March. He is the only investigator to successfully maintain *Trichodesmium* in culture.

MSRC Student Chosen Knauss Marine Policy Fellow

Sanjay Gupta, a student of physical oceanographer Dong-Ping Wang, has been awarded a John A. Knauss marine policy fellowship from New York Sea Grant. For the one-year fellowship, Sanjay will be working in Washington, D.C. with New Jersey Representative Frank Pallone, Jr. on reauthorizing the Clean Water Act.

MSRC To Hold Open House-Earth Day Celebration April 25

Touch live marine creatures at the "Marine Petting Zoo," help paint an Environmental Mural; See the sea floor through cut-away core samples; win a prize by passing the Earth Day Quiz; see the oceans of Planet Earth as seen from satellite. These and many more attractions will be on hand on Saturday April 25 from 11 a.m. till 4 p.m. at the MSRC campus for Long Islanders to participate in, observe, and learn about the marine environment.

NY DEC asks New Yorkers to "Return a Gift to Wildlife"

As we approach tax filing count down, the NY Department of Conservation asks residents to consider the bottom line—the place where you can enter an amount of your tax return to be directed to their Return a Gift to Wildlife program.

This program earmarks worthy wildlife management, habitat protection, and education projects that are underfunded because of declining Federal revenues. These include the marine mammal and sea turtle stranding program and oil spill response training program. If you aren't getting a refund, you can donate directly to "Return a Gift to Wildlife," 50 Wolf Road, Room 532, Albany 12233-4830.



JEANNETTE YEN

Escape and Feeding Behavior of Copepods

Marine ecologists have long sought to understand the complications of plankton feeding dynamics, called "trophic interactions." To understand how the food web works—what eats what, how much they eat, and how they obtain their food—MSRC's Jeannette Yen has focused closely on some of the smallest marine animals.

Phytoplankton, the smallest, single-cell plants are at the base of the food web. The minute "bugs" of the sea, called zooplankton, are a major component of the food web. While some zooplankton are "grazers" on phytoplankton, others are carnivores, eating other, smaller zooplankton.

One group member of the zooplankton community, the copepods, are both grazers and carnivores, but it is the carnivorous copepods that have been the subject of much close scrutiny by Yen. With her microscope-laser-video set-up, she is capable of seeing feeding behavior in the most minute detail by capturing it magnified on film, and then analyzing each frame.

"Feeding experiments used to be done in "black box" fashion.

You put in the prey, put in the predator, and look in after 24 hours to see who's left," said Yen, who is among the first scientists to film predatory behavior. "But now that I get to actually watch them feed, a new dimension has been added."

Such frame-by-frame analyses have proven that copepods, contrary to the long-held notion that they feed by chance on whatever they bump into, are very actively directing their food acquisition. Some species of copepods are capable of using dual, chemical and mechanical, sensory receptors on their antennae to detect the prey's movements, and then, by using all their appendages in complex ways, to channel the unknowing prey toward them by creating a current and capturing the prey before it can escape.

Scientists have been filming copepod behavior for about a decade and have only recently discovered how complex it is. "These methods are so new—we are seeing things we have never seen before and don't know how often it happens and why they are doing it," said Yen. But even though she enjoys the videotaping and watching, she must also quantify what she is seeing, and this is the difficult part of her work.

She and her students have been trying to quantify copepod feeding behavior via fluid mechanics—by measuring the velocity of the water flow field, or currents, generated by the copepod as it actively paddles its appendages. "We are tracking the feeding currents, like a physical oceanographer tracks oceanic currents," said Yen. "We use phytoplankton particles as 'drogues' [a current measuring instrument] to track currents moving at very small scales—5 mm per second. We need to know, from the predator's point of view, how fast it's bringing water to its

mouth, as well as how fast it is moving through the water, to understand how often the animal might encounter its food."

And from the prey's point of view, she wants to know what kinds of forces it has to overcome to avoid being eaten. It must sense the flow field and distinguish between a "background" current and one generated by something that might eat it. It must be able to sense when the flow field is too strong such that it must get away quickly.

Yen, who has been working with copepods since 1977, received her Ph.D. at the University of Washington in 1982. She then chose postdoctoral positions that would offer her a chance to compare copepod feeding behavior at different latitudes: the University of Bergen in Norway, the Institute of Marine Biochemistry in Scotland, and the University of Hawaii. At the University of Hawaii, she continued as research scientist, also conducting copepod research in Antarctica, until joining MSRC as assistant professor in 1989.

According to Yen, one of the best things that has happened to her since joining MSRC is her collaboration with physical oceanographer Akira Okubo. "Both of us enjoy this collaboration," said Yen. "Akira's slant is more theoretical; he has certain ideas he has thought about for a long time, but hasn't been able to apply his models to test them, and I can provide the empirical data to test and verify his models."

One such concept that joins Okubo and Yen is Okubo's model of swarming behavior in insects. They decided to see if the model would apply equally to marine bugs—her copepods. The results were promising enough that they are hoping for a paper to be published and a grant proposal to be funded on this recent work. ■

Faculty & Alumni Notes

Alumnus Mark Tedesco to Direct LI Sound Study Office at MSRC

After receiving his MA in 1986, MSRC alumnus Mark Tedesco began working for the U. S. Environmental Protection Agency (EPA). He started with the EPA as policy and program integration branch project manager, overseeing grants to administer the federal clean water and clean air acts in Puerto Rico and the U.S. Virgin Islands.

Since the summer of 1989, he has been involved in a project closer to home—the Long Island Sound Study, part of the EPA's National Estuary Program. His job has been to coordinate the day-to-day program activities with all the various working groups.

Now that the LI Sound Study is nearly complete, he will head the Stamford and Stony Brook Long Island Sound Study offices to implement and follow up on the recommendations from the study and to continue EPA's support for the program and its public information role.

Chemical oceanographer **Cindy Lee** gave a talk at the February American Society of Limnology and Oceanography (ASLO) meeting in Santa Fe. The talk was entitled, "Controls on carbon preservation: the role of bacterial grazers." Lee also gave a seminar on this subject at University of Connecticut at Avery Point.

Biological oceanographer **Darcy Lonsdale** was recently appointed chairperson of the endowment fund committee for ASLO. The fund raising is aimed at enhancing student membership and participation in ASLO conferences, as well as to provide enhanced professional services for all members.

Lonsdale and three of her students attended the February ASLO meeting. Lonsdale chaired a session



Friday Discussion Group Hosts Alumna Betsy Adamson

MSRC faculty, students, and staff are always eager to hear what its alumni are doing, but especially so when they return to tell us that they have interesting, challenging jobs. Such was the case when MS graduate (1979) Betsy Adamson returned for a Friday Discussion Group meeting in January to tell us about her work with the Commissioner of New York City's Department of Environmental Protection (DEP).

According to Adamson, who is part of the recently established Natural Resources unit overseeing estuarine and wetland policy in New York City, this is the type of job she has always wanted. "When I left Stony Brook, I was interested in seeing science used as a tool for decision making," said Adamson. And in her position, she witnesses the interaction of the science on which the regulations are based and the actual day-to-day working decisions.

From reviewing and formulating policy on development and sewerage to coordinating the Jamaica Bay Task Force, she also has found the right balance of office and field work, which takes her into a diversity of interesting habitats. And from this advantaged position, she described for her audience the many opportunities for MSRC researchers to become involved with real-world problem solving research in the area.

One of the guiding principles of her research program is

to determine how to balance "use attainability"—how close the DEP can get to the standards of the Federal Clean Water Act—with the costs of improvements and their benefits to the living resources in the harbor estuary. For the city's planning and development agencies she cautions that potential development of open land without an eye on the cost of storm and sanitary waste treatment is short-sighted. A less expensive alternative might mean keeping a particular parcel unsold to maintain open land for a water course, water storage, runoff retention, or wetlands.

"This past year our unit earned its way at the DEP through 'value engineering'," said Adamson. "By planning development infrastructure design in a more thoughtful way, we use less resources and enhance the environment with less public cost."

Assemblyman Englebright Discusses Preserving the Peconics

New York Assemblyman from Long Island Steven Englebright came to MSRC early in February to discuss several reasons to preserve the Peconics, besides the obvious—that it is a scenic treasure bringing tourism to the East End. According to him, scientific discovery is waiting to happen there regarding offshore peat deposits (evidence of sea level intrusion); Calverton Ponds (we don't know how they were formed); the largest populations of rare species in New York, including carnivorous plants we know little about; and the dwarf pines (why are they so small?).



MSRC Offers New Course, "Doing Business on Long Island"

Doing business on Long Island and satisfying its myriad public and environmental regulations can be confusing, confounding, and discouraging. But on June 9 and 10, a new short course will be held at MSRC to help businesses starting up and existing businesses wanting to expand, as well as realtors, developers, and government administrators, with the ins and outs of conforming with Long Island's environmental regulations.

The idea for a course to help guide businesses step-by-step through the rules and regulations was an outgrowth of MSRC's involvement with the Long Island Environmental Economic Roundtable. The Roundtable is the only forum on Long Island that combines environmentalists and business leaders in a partnership to develop sustainable economic goals and plans that are consistent with a sound environment. MSRC and others involved with the Roundtable felt that the course would help attract new, appropriate businesses to Long Island.

"Doing Business on Long Island" will be conducted by experts in agency requirements. Topping the list of instructors will be Aldo Andreoli, former director of the

Division of Environmental Quality, Suffolk County Department of Health Services, and Harold Berger, former Region I Director of the NY State Department of Conservation. Further information on this course can be obtained by calling the Director's office at MSRC (516-632-8701).

Donated Instruments Aid Researchers

MSRC will soon be receiving new instrumentation for measuring trace metals in parts per billion concentration. Hitachi Instruments, Inc. of Japan donated the new polarized Zeeman atomic absorption spectrophotometer and furnace autosampler to New York State. Governor Mario Cuomo and Dr. H. Graham Jones, Executive Director of New York State Science and Technology Foundation, selected MSRC to receive the gift.



The new spectrophotometer will greatly expand the capabilities of MSRC researchers like Professors Vince Breslin and Frank Roethel, who need to sample for trace metals typically eight or more hours a day, five days a week.

For the past 15 years, MSRC has relied on a single spectrophotometer. Breslin's and Roethel's continual usage has made it difficult in the past for students to learn how to use an atomic absorption spectrophotometer, except at odd hours and on weekends. "With this expanded capability," said Breslin, "we will be able to use it as a teaching tool."

Other faculty at MSRC and the University will now have increased access with the additional spectrophotometer. MSRC has a commitment to make the instruments available to the new Long Island Research Institute and the New York Department of Environmental Conservation, as well.

Breslin and Roethel are the campus experts in atomic absorption spectrophotometry. Their lab is certified by the NY State Department of Health, which periodically inspects their equipment, techniques, and recordkeeping for trace metal analyses.

Vincent Breslin sampling for trace metals with atomic absorption spectrophotometer.



State University of New York at Stony Brook
Stony Brook, N.Y. 11794-5000

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