

# Marine Sciences Research Center



N E W S L E T T E R

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## NEW MSRC PLANS ANNOUNCED ON LEGISLATIVE CRUISE

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MSRC Director J.R. Schubel (l.), NY Assemblyman James D. Conte and NY State Senator Kenneth P. Lavallo aboard the R/V ONRUST.

### Partnership with Nature Conservancy

Dean and Director Jerry Schubel announced several new MSRC ventures to local legislators during a cruise aboard the R/V *ONRUST* in early September. One is MSRC's partnership with the Nature Conservancy to take the lead in developing and conducting a research program for a part of Long Island's East End, designated the Peconics/Block Island "Bioreserve."

Along with Mexico's Yucatan Peninsula, the Andean condor refuge, and the Florida Keys, this Bioreserve has been selected as one of the Conservancy's 12 "Last Great Places: An Alliance for People and the Environment" program. The program calls on the resources of designated public and private organizations and the Conservancy

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### LI Sound Study Branch Office at MSRC

A new branch office for monitoring and continuing research of the Long Island Sound will soon be sited at the MSRC. The joint federal, state, and local effort is the outgrowth of the U.S. Environmental Protection Agency-sponsored study of hypoxia (low dissolved oxygen) in the Sound. The lead office will be established in Stamford, Connecticut.

MSRC scientists were involved in the six-year study of the Sound, which is included in the National Estuary Program, from its design phase through the research phase. "Having the office here gives MSRC the opportunity to work closely on the next phase of the Sound Study, to use the scientific knowledge we gained to manage and rehabilitate the Sound," said Schubel. "Our faculty will be able to interact with the study office personnel, performing additional research and designing and conducting a monitoring program."

Locating the office here will also offer continuity for the study's public outreach program. Like the Stamford office, the Stony Brook office will be staffed by Sea Grant personnel who will continue and expand their existing education and citizen involvement efforts.





*Biological Oceanographer Darcy Lonsdale discusses intertidal marsh ecology to science teachers attending LILCO-MSRC workshop.*

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to study and manage economic needs in ways that will not harm the ecosystems.

Integral to the program, and where MSRC has a role, is to understand the basic oceanographic characteristics of the Peconics. This information will provide the basis for managing human activities such as housing development, farming, tourism, and fisheries so that they will not affect threatened and endangered species.

The Peconics have also been nominated for inclusion in the U.S. Environmental Protection Agency's National Estuary Program (NEP). The goal of the NEP is to develop a comprehensive conservation and management plan, based on results of research conducted on the estuaries. "Long-term management has to be developed from good, solid science, and the science must be based on how these systems operate and what impacts them," Schubel told the legislators.

MSRC has been active in the past on NEP research programs for two local estuaries: the Long Island Sound Study and New York-New Jersey Harbor Estuary Study. "Since the Peconics will be New York's third to be included in the NEP, other states will be looking at us—to see whether we have extracted lessons from earlier programs and are applying these lessons to others," said Schubel, who is frequently invited to lead partnership-forming workshops with scientists, managers, and citizens' groups for estuary management throughout the country. ■

### **Workshop Series Joins LILCO – MSRC – LI Educators**

A series of five Long Island Lighting Company (LILCO)-MSRC sponsored workshops, entitled "Choices," began at MSRC on October 5 for nearly 30 high school teachers. The agenda for the five day-long Saturday sessions, organized by MSRC's James Mackin, covered a number of different energy and environmental issues, such as, "The Evolving L.I. Landscape: Population, Transportation, Housing, Energy, Environment." Besides the lectures given by a number of MSRC, LILCO, and other experts, field trips to the Brookhaven municipal recycling facility and the Flax Pond tidal marsh were also on the agenda.

The ultimate goal of the project is to develop teaching modules for the New York Science, Technology and Society Education Project (NYSTEP), which will be used in Long Island school science programs for grades 7 through 10. Existing modules on land, water, transportation, and solid waste are written with upstate environmental conditions in mind, and do not take Long Island's distinct environment into consideration, such as the closing of our landfills after 1992 to protect Long Island's aquifer, the sole source of drinking water.

NYSTEP is one of the first and most successful programs in the nation to form partnerships between schools and businesses. In New York, this partnership is between the Science Bureau of the State Education Department and New York investor-owned utilities. ■

### **First Student Symposium Held by MSRC Graduate Students**

Sigrun Jonasdottir, Francis Juanes, Miguel Olaizola, and Ajit Subramaniam planned and organized a First Annual Student Symposium and Clam Bake this past October. Twenty students were invited to present posters or give talks to an audience of over 90, including a panel of faculty members who gave written critiques on the basis of science content and presentation style.

The students' goal was to provide a forum to present their research to the MSRC community for discussion, to exchange ideas and obtain feedback, and to gain practice for giving talks and posters at national meetings. They easily achieved all those goals and more, as evidenced by the quality of their research and the very professional presentations.

Graduate students Bob Chant, Robert Cho, Patrick Dooley, Sidney Fauria, Jonathan Hare, Francis Juanes, Byeong-Gweon Lee, Jang-Geun Park, Teresa Rotunno, Ralph Tegge, Arnoldo Valle-Levinson, Randy Young, Chung-Wu Wang, and Ningli Zhu gave talks. Byron Boekhoudt, Sigrun Jonasdottir, Miguel Olaizola, Kate Stansfield, Ajit Subramaniam, and Xu-Chen Wang, presented posters of their research. ■



## Staudte Award Presented at Student Symposium

Physical oceanography doctoral student Arnoldo Valle-Levinson received the Kenneth Staudte Award at the first Student Symposium. This award is made annually in memory of Stony Brook alumnus Staudte, and is presented to the MSRC student proposing the most innovative and important project that contributes to the resolution of a complex environmental problem through application of the results of research.

Valle-Levinson's research, conducted with advisor Robert Wilson, focuses on the physical mechanisms that contribute to hypoxia and anoxia in western Long Island Sound. He is especially interested in how density stratification influences vertical mixing. Inhibition of vertical mixing deprives the bottom of oxygen, and with other factors present, can contribute to hypoxia. ■

## Arno Penzias Fellowship Awarded

Chongle Zhang was awarded the first Arno Penzias Fellowship, which is presented to an MSRC student working on problems of improving tools, techniques, and strategies to transform environmental data into information useful to decision makers. Zhang has been adapting a variety of pattern recognition techniques to large environmental data sets. The fellowship is a donation of Nobel Laureate, astronomer, and author Penzias. ■



Chongle Zhen (l) and Arnoldo Valle-Levinson



## URECA Summer Fellow Aids Bay Scallop Project

SUNY undergraduate student Shino Tanikawa-Oglesby has a good head start on her career move from graphics artist to marine scientist at MSRC. Shino got hooked on the marine environment while taking a course in scuba diving, and in 1990 began working as a volunteer with MSRC biological oceanographer Monica Bricelj on a NY Sea Grant-sponsored project.

While fulfilling her science requirements in preparation for Fall 1992 application to MSRC, Shino has been working on Bricelj's scallop predation project as a URECA (Undergraduate Research and Creative Activities) summer research fellow. The goal of the URECA program is to match talented undergraduates with faculty sponsors in areas of their research interest.

Bricelj is investigating juvenile scallop mortality from predation during the period following settlement—after they leave the water column and attach to bottom surfaces. Predation on scallops by bottom predators, particularly crabs, is severe during this stage, but it seems to be less so when the scallops settle on eelgrass blades, which provide a partial refuge.

While Shino was diving on the scallop project in Peconic bays, she observed that puffer fish (*Spheroides maculatus*), commonly found in eelgrass beds but not previously reported as a predator of bay scallops, were eating the juvenile scallops. Now Shino is helping Bricelj investigate the vulnerability to puffer fish, as well as other swimming predators such as blue crabs, which may more readily access the eelgrass canopy and impact the scarce scallop populations in eastern Long Island bays. ■

## ALUMNI & FACULTY NOTES

### New Alumni Association Officers for 1991-92

President, Frank Roethel  
Vice President, Anne West-Valle  
Secretary, Thomas Wilson  
Treasurer, Melissa Beristain.

### Alumni Association Awards

Congratulations to **Jiong Shen**, who received the 1991 MSRC Alumni Association award for best Master's Thesis proposal. The proposal is titled, "Enhancing CTD System Performance."

Also congratulations to Assistant Professor **Robert Cerrato** for receiving the 1991 Alumni Association Faculty/Staff Award. This prize, based on student nominations, is presented annually to an MSRC faculty or staff member who demonstrates exceptional commitment to assisting the students.

Professor **Kirk Cochran** attended the fall meeting of the Joint Global Ocean Flux Study (JGOFS) Steering committee in Monterey, California in October.

Along with Postdoctoral Associate **Christina Barnes**, Cochran attended a meeting in November of principal investigators for a recently funded multi-institution, multidisciplinary research project to study the northeast water polynya—a space of open water amid the ice off Greenland. The investigators will use the 400-foot Coast Guard icebreaker *Polar Sea* to take samples in the polynya in August 1992.

Research Scientist **David Hirschberg** attended a meeting in San Diego of principal investigators for the JGOFS Equatorial Pacific Study in September. Professor Kirk Cochran and Hirschberg are included in a series of three cruises scheduled for spring and fall 1992 on the R/V *Thomas Thompson*, the new research vessel of the University of Washington.

Associate Professor **David Conover** received an award for "the most significant paper" published in the journal, "Transactions of the American Fisheries Society" at the American Fisheries Society annual meeting held this past September in San Antonio. The paper titled, "The relation and capacity for growth and length of the growing season: evidence

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and implications of countergradient variation," was chosen from over 120 papers published in this journal during 1990.

Professor **Cindy Lee** attended the Geological Society of America meeting in San Diego in October as Chair of the Organic Geochemistry Division. She was recently appointed Chair of the National Science Foundation's Advisory Committee on Ocean Sciences. She will be involved with long-range planning for NSF's ocean sciences program.

Lee gave a talk at the National Forum on Ocean Conservation in November at the Smithsonian Institution in Washington, D.C. and will attend the SCOPE meeting (Scientific Committee for the Protection of the Environment) in December. SCOPE is a committee of the National Academy of Sciences.

Lee and Coastal Marine Scholar Marie de Angelis were awarded an NSF grant for their proposal titled, "An investigation of mechanisms for the formation of methane in the upper ocean."

Professor **Charles Nittrouer** was recently elected to the UNOLS Executive Council. UNOLS (University-National Oceanographic Laboratory System) manages the academic research fleet used by marine institutions throughout the country.

Nittrouer has received approval for a renewal of the multi-institutional, multidisciplinary AmasSeds project to 1993. The goal of the AmasSeds project is to study oceanographic processes at the mouth of the Amazon River in Brazil.

He and his students have recently completed their fourth major AmasSeds cruise off the coast of Brazil.

In December, he presented a talk titled, "A turbidity event in bottom waters of the Southwestern Ross Sea: biogenic or lithogenic source?" at the the American Geological Union meeting in San Francisco.

Professor **Akira Okubo's** paper, "Spread of Invading Organisms" was selected by the U.S. Chapter of the International Association for Landscape Ecology as the "Best Publication in Landscape Ecology" for 1991.

Dean and Director **J. R. Schubel** was invited to participate in the Third Annual New York State-Italy Symposium, "Public-Private Partnership for Urban Revitalization" by Matilda Cuomo, co-President of the program. The symposium was held in Rome this past November.

Associate Professor **Mary Scranton** and Coastal Marine Scholar **Marie de Angelis** cruised the Hudson from Albany to New York City studying sources and sinks of methane in August. During the same month, Scranton, de Angelis, and students Xiaohua Yang and Hanguo Wu participated in field experiments in anoxic basins of the Pettaquamscutt River, Rhode Island to investigate the geochemistry of methane, hydrogen, and low molecular weight organic compounds.

In September Scranton chaired a session at the fall American Chemical Society meeting in Manhattan on

geochemistry of ocean margins. At this meeting she presented a paper on the work she and de Angelis are doing on the Hudson.

In November, Scranton presented a seminar at the University of Connecticut, Avery Point, titled "Methane cycling in an anoxic basin: the Pettaquamscutt River,"

Waste Management Institute Director, **Larry Swanson**, along with staff member Anne West Valle and students Arnoldo Valle-Levinson, Todd Echelman, Marci Bortman, and Vera Agostini, participated in three cruises with the NY City Department of Environmental Protection this summer. The purpose of these cruises aboard the R/V *Osprey* was to examine the levels of bottom dissolved oxygen in the New York Bight area, particularly along the northern New Jersey coast, a site of frequent bouts of low dissolved oxygen.

Associate Professor **Charles Wurster** served as staff ornithologist on an ecological tour aboard the M.S. *Polaris* from June 8 through July 10 as it circumnavigated the British Isles. The tour passed northward along the Coast of Norway from Bergen to Tromso, crossed the Barents Sea, and circled Svalbard beyond 80° N to the limit of pack ice. The ship landed on some of the world's most spectacular sea bird islands, including St. Kilda, west of Scotland, and Bear Island in the Barents Sea.

Assistant Professor **Jeannette Yen** was appointed to the Polar Collection Advisory Board to the Smithsonian Oceanographic Society Center. ■



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

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## W E L C O M E S



**Dr. Kamazima Lwiza** has just arrived at MSRC from a postdoctoral position at University of Wales, Bangor (northern) Wales, United Kingdom. He grew up on the shores of Lake Victoria, Tanzania, completed his undergraduate work at the University of Daar es Salaam, Tanzania, then received his Ph.D. from University of Wales, the largest marine institute in the U.K. Dr. Lwiza is Research Assistant Professor in physical oceanography, specializing in the structure and dynamics of shelf-seas and remote sensing oceanography. ■



**Dr. Anne E. McElroy** has joined the MSRC faculty along with her appointment as the new Director of New York Sea Grant Institute. Dr. McElroy, who replaces Dr. Robert Malouf, was previously associate professor of environmental science at the University of Massachusetts in Boston, working with contaminants in seafood and in the environment. Dr. McElroy received her Ph.D. in oceanography from the Massachusetts Institute of Technology/Woods Hole Oceanographic Institution. ■



**Charles James** joins our staff as Flax Pond Laboratories manager after 10 years as Research Scientist at the Institute for Scientific Research, Kuwait. After all facilities were destroyed at the Institute during the Gulf War, James worked as an aquaculture consultant for several countries. He came to the U.S. in March 1991, where he has been finishing a chapter for a book on the use of chemostats in aquaculture to be published by Springer-Verlag. The focus of his research and work includes hatchery techniques of marine finfish, shellfish and shrimp larval rearing; intensive microalgae production systems; and recycled closed fish culture systems. ■

## C R U I S E S , C R U I S E S , C R U I S E S

*American Association of University Women, Nassau Chapter members cruise LI Sound with MSRC's Darcy Lonsdale (r.).*



*1991 Alumni Association annual cruise with MSRC's Bill Wise (standing l.) and Mark Wiggins (seated).*

*BOCES II summer intern, Paul Athaloro, working on samples he collected in LI Sound for Associate Research Professor Josie Aller's research program to investigate summer development of hypoxia. BOCES places gifted and talented high school students in positions for hands-on learning.*

### **Stewardship Expo**

MSRC and New York Sea Grant Extension Program sponsored a marine environmental stewardship expo at SUNY Farmingdale December 5. The aim of the expo was to teach civic, community, business, and environmental organizations how to get involved in protecting and monitoring coastal resources. ■

### **New MSRC Publications**

"The Great South Bay," edited by J. R. Schubel, T. M. Bell and H. H. Carter, is now in print and available from SUNY Press, c/o CUP Services, P.O. Box 6525, Ithaca, NY 14851 (607-277-2211). ■



EDWARD CARPENTER

### Understanding an Unusual Cyanobacterium

For nearly 20 years, Edward Carpenter has been investigating colony-forming cyanobacteria (blue-green algae) in the genus *Trichodesmium*. It is "an oddball" microorganism in the phytoplankton world, according to him, because of its large size, its ability to form massive blooms that can cover thousands of square kilometers, and its ability to fix nitrogen—to convert atmospheric nitrogen into proteins. While Carpenter works on all types of phytoplankton, for all the years he has been studying *Trichodesmium*, it continues to surprise him.

Nitrogen fixation by cyanobacteria is an important process in environments without terrestrial nitrogen sources. Unlike coastal regions where nitrogen is usually never scarce, *Trichodesmium* lives in the photic zone of nitrogen-impooverished tropical North Atlantic ocean waters, where only gaseous, atmospheric nitrogen is available in abundance. But while gaseous nitrogen is abundant, it is not in a form for direct use by most organisms. *Trichodesmium*, however, can convert gaseous nitrogen—via a process like that used by clover and soybeans—into a form used with carbon to make new protein. When new proteins are made, more food is available to other members of the food web as they graze on the *Trichodesmium* colonies. It is like adding fertilizer to a nutrient-poor garden; every organism in the food web is ultimately a beneficiary.

Carpenter, who came to MSRC in 1975 from Woods Hole Oceanographic Institution after several successive

positions, beginning with postdoctoral fellow and leaving as Associate Research Scientist, is presently focusing on how *Trichodesmium* protects its nitrogenase from oxygen deactivation. *Trichodesmium* is not the only phytoplankton with the ability to fix nitrogen. "Paradoxically, unlike the other cyanobacteria, it does so during the daytime—when it is also photosynthesizing and making oxygen," said Carpenter. Nitrogenase, the enzyme that is needed for the reaction in nitrogen fixation, is disabled in the presence of oxygen, so the enzyme must be protected from oxygen. It also lacks the heterocysts that other cyanobacteria use to spatially segregate the oxygen-generating processes from the nitrogen-fixing enzymes. Heterocysts are specialized, thick-walled cells that do not need or have any oxygen in them.

*Trichodesmium* must have a mechanism to protect its nitrogenase from coming in contact with the oxygen, but the question remains, What is that mechanism? Using sophisticated immunological stain techniques, Carpenter and MSRC colleague Assistant Research Professor Jeng Chang have been trying to localize what may serve as a heterocyst equivalent—the part of this organism's cell that may be involved in sequestering and protecting nitrogenase.

Carpenter and his students are attempting to determine the frequency and extent of *Trichodesmium* blooms in the world's oceans, using remote (satellite) sensing, developing algorithms for measuring its presence and density. They are also working on what aspect of the organism's basic physiology stimulates it to bloom. They know under what environmental prescription it tends to bloom—very calm wave-free waters, sunny, and warm (about 25° C or warmer) weather, and a sprinkling of dust. The dust blows west from the Sahara to the Atlantic, providing the much needed source of iron to boost their growth. One of the legacies of the Gulf War is a broken up desert surface, a result of tanks rolling over plants and destabilizing the surface. Carpenter thinks that this may provide a new source of dust available to be blown to sea, and perhaps stimulate more blooms.

The Mediterranean has been notoriously plagued with blooms, going back to biblical times. One blooming *Trichodesmium* species that inhabits the

Red Sea has an accessory pigment, phycoerythrin, which allows it to capture other light wavelengths that chlorophyll *a* does not. The pigment also gives the organism a red color, which during blooms may account for the origin of the Red Sea's name.

With regard to general phytoplankton research, Carpenter and Chang are trying to measure species-specific growth rates of other species of phytoplankton. Their goal is to determine how important individual species are in primary productivity by looking at growth rates and what regulates growth. They hope to accomplish this by developing molecular biological techniques allowing easier measurements at sea and to make these techniques more universally applicable to other researchers.

Specifically, the two researchers are trying to develop a marker—a compound naturally present during different cell cycle stages that can be "tagged" with antibodies. This would allow them to detect when the cells are ready to divide, and from this to calculate how fast the whole population is dividing. Thus, they can determine how rapidly each species is growing and how important it is in the marine food web. Information on growth rates will be extremely useful in aquaculture, in determining growth of toxic species, understanding blooms and environmental conditions causing slow or fast growth.

As much as Carpenter loves working on any phytoplankton species, however, "Tricho" is his favorite. "I am convinced it is a keystone species in tropical and subtropical seas," said Carpenter. "It is very important to the global carbon and nitrogen cycle, because nitrogen fixed by *Trichodesmium* stimulates growth of other phytoplankton."

Recently, Carpenter has learned a piece of exciting news from his studies which appears in the November 29 issue of *Science*: that *Trichodesmium's* rate of nitrogen and, thus, carbon fixation is much higher than the scientific community previously thought. In fact, it appears to be the major primary producer in the photic zone of the Sargasso Sea, tropical Atlantic, and Caribbean Sea and possibly other tropical oceans of the world. One more piece of information in the puzzle that might occupy him for another 20 years. ■