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NEW MSRC PLANS ANNOUNCED ON LEGISLATIVE CRUISE

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.
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.

First Student Symposium Held by MSRC Graduate Students

Sigrun Jonasdottir, Francis Juanes, Miguel Olaiizola, 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 Olaiizola, Kate Stansfield, Ajit Subramaniam, and Xu-Chen Wang presented posters of their research.
**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 (JGOPS) Steering Committee in Monterey, California in October. Along with Postdoctoral Associate Christina Barnes, Cochran attended a meeting in November of principal investigators for the 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 JGOPS 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..." is included in this issue.
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 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 Jeanette Yen was appointed to the Polar Collection Advisory Board to the Smithsonian Oceanographic Society Center.
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.

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

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
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-poor 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 phytoplankter 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.