MSRC Newsletter Vol. 8 No. 1

Fall 1998

Marvin Geller Heads MSRC

Dr. Marvin Geller has been named Dean and Director of the State University at Stony Brook's Marine Sciences Research Center (MSRC).

As director of one of the nation's top-ten oceanographic research institutions and the country's premier coastal research institution, Dr. Geller will head a staff of over 50 scientists conducting research in biological, physical, chemical and geological oceanography, and atmospheric sciences. Research at the MSRC and its institutes focuses on important global and regional environmental issues. The Center also prepares 125 graduate students and 35 undergraduates for careers in marine sciences and related fields. Dr. Geller will also oversee the Center's $10 million budget.

Dr. Geller, a meteorologist who previously headed the University's Institute for Terrestrial and Planetary Atmospheres, replaces MSRC Dean and Director J. Kirk Cochran, who has returned to full-time teaching and research.

Dr. Geller emphasized the importance of the Center's undergraduate and graduate educational mission and said he wants the Center "to continue and improve upon its excellence in both global scale atmospheric and oceanic research, and its research into important regional problems that affect Long Island and the coastal areas of New York."

Before coming to Stony Brook eight and a half years ago to be the first director of the Institute for Terrestrial and Planetary Atmospheres, Dr. Geller was chief of the Laboratory for Atmospheres at the National Aeronautic and Space Administration's (NASA) Goddard Space Flight Center, supervising some 350 scientists and other staff.

Dr. Geller has chaired the National Research Council Committee on Solar-Terrestrial Research and serves on the Board on Atmospheric Sciences and Climate. He is co-chair of the project, Stratospheric Processes and their Role in Climate, of the World Climate Research Program. He has published approximately 70 articles in scientific journals and has been a Fellow of the American Meterological Society since 1984.

Dr. Geller received his doctorate in meteorology from the Massachusetts Institute of Technology and held faculty positions at the University of Illinois at Urbana-Champaign, and the University of Miami's Rosenstiel School of Marine and Atmospheric Sciencies before joining NASA's Goddard Space Flight Center.

A native of Massachusetts, Dr. Geller lives in Port Jefferson.

Gordon Taylor Wins Patent for Anti-Biofouling Coating

As any boat owner knows, boat bottoms and other underwater surfaces rapidly develop a coating of algae, mussels, barnacles and other growths. Now, an MSRC researcher has been awarded a patent for a natural product that will deter biofouling without harming the environment.

Gordon Taylor, a biological oceanographer at MSRC, has been awarded the patent for natural products derived from marine seaweeds as well as some coastal invertebrates. These organisms produce secondary metabolites that are repellent to many of the bacteria and repellent to other plants and animals.

Dr. Taylor said these products will be used to create a new generation of anti-fouling coatings. The patent is shared by the Research Foundation of the State University of New York and the former Long Island Lighting Company.

Because utilities must find ways to reduce fouling in power plant water intake systems and heat exchangers to improve power generation efficiency, Dr. Taylor's research was funded by LILCO and the Empire State Electrical Energy Research Corp. (ESEERCO).

Existing anti-fouling coatings typically contain toxic metals, such as copper. They used to contain tributyl tin, which is now banned. These coatings released bioactive materials that accumulated in local coastal environments and remained toxic to organisms on the sea floor.

Dr. Taylor said that one of the products, which has been tested in organisms in Long Island waters, may also prove effective in preventing zebra mussels from adhering to surfaces. The zebra mussel, accidentally introduced in 1988 from the ballast of a ship in Lake St. Clair, has become a major pest. Cleanup costs since 1988 have totalled over $300 million.

To do field tests on the extracts, Dr. Taylor's group mixed them with commercial silicone polymers to paint onto surfaces and left them in both salt- and fresh-water environments for up to 90 days. Test panels with these novel coatings performed as well as those coated with commercial copper paint.

"The twist on this is that we are taking something that was derived from the ecosystem and returning it to water intake systems and other surfaces to protect man-made structures from biological invasion. We are returning it to the same ecosystem."

The next step will be to isolate the active ingredients in the extracts, so they can be synthesized and commercially produced. Then a compatible material for the repellent will be evaluated. Dr. Taylor is looking to add the algae extracts to a coating that is water-repellent and biologically inactive.

A View from the Bottom: MSRC's New Scanner

The MSRC research vessel ONRUST has been outfitted with a $600,000 state-of-the-art sonar system capable of making highly accurate measurements of the sea bottom. Stony Brook is the first university in the nation to own and operate such a system.

The Kongsberg-Simrad EM 3000 system represents a "major step that will lead to a dramatically better view of the ocean bottom in coastal areas," says MSRC geologist Roger Flood in describing the Center's EM 3000, a multibeam echo sounder that uses sonar to map the shallow sea bottom at highly-accurate resolution.

With an assist in funding from the Office of Naval Research, Stony Brook is sharing the cost of acquiring the EM 3000 with Columbia University and the University of New Brunswick in Canada.

The EM 3000 system is so accurate, it can measure sea bottom features precisely to five-centimeters and takes depth measurements every 20 centimeters.

Most sonar systems send out a brief noise impulse or "ping" that bounces off the bottom directly beneath the ship and echoes back to a transducer. The time it takes for the echo to return is translated into a single distance measurement. The EM 3000 effectively sends out 127 beams in a swath that fans out from the transducer and sweeps along the sea bottom as the ship moves resulting in 127 simultaneous depth measurements across the ship track. The swath is four-times as wide as the water depth.

To get this accuracy, the system corrects for the ship's motion in the water, so "it always 'knows' exactly where the ship is," Dr. Flood said. The scanner will run twice as fast as ordinary towed side-scan sonar mappers: up to 10 knots, instead of under five knots.

The system is ideal for shallow coastal waters of depths between one-half meter and 100 meters. The first projects include testing in Long Island Sound and New York Harbor, mapping 35-miles of the Hudson River north of the Tappanzee Bridge, and looking at the continental margin off New Jersey.

Evan Liblit Memorial Fund Kick Off

University President Shirley Strum Kenny receives a $15,000 check from the Evan R. Liblit Memorial Fund for a scholarship to support graduate students at the Marine Sciences Research Center's Waste Reduction and Management Institute (WRMI). L to r: Mitchell Pally, LIA Vice Presdient of Legislative Affairs; Dr. Kenny; Donald J. Middleton, Huntington Town Deputy Director of Planning; Dennis Lynch, Brookhaven Commissioner of Waste Management; Dr. Lawrence Swanson, WRMI Director; Anthony Leteri, President, USA Recycling.

FOCUS ON RESEARCH: Andrei Y. Chistoserdov

Andrei Y. Chistoserdov came to the MSRC as an assistant professor in 1995 after five years as a visiting associate and senior research fellow in the laboratory of M.E. Lidstrom at the California Institute of Technology. Before arriving at Caltech he was a researcher at Moscow's Institute of Genetics and Selection of Industrial Micro Organisms, where he received a Ph.D. in 1985 for work on the expression of human interferon genes. Dr. Chistoserdov spoke with MSRC News at his office in Discovery Hall.

MSRC News: How did you choose science as a career?

AC: Science in the Soviet Union was probably one of the most prestigious careers available for people from ordinary families. I was studying in high school with mathematics and physical specialization and my peers and myself were oriented to go to physics, mathematics and engineering . However, I decided to go to biology or medicine, since they appeared to me to be very exciting fields. I applied to the Biology Science Division of the Moscow State University, passed the qualifying exams, and was offered a student position, which I accepted. In 1982 I received a MS degree from the Department of Molecular Biology of the Moscow State University. I liked the educational system in the Soviet Union: I would call it encyclopedic. The program was very intense, seven to ten courses per semester. Students were not allowed to choose courses until their fourth year, and even then one could choose only about 30 percent of his or her courses. The Moscow State University is about 300 years old and it is sad to see that the education system developed by centuries is giving way to a new Western system being introduced in Russia right now.

I planned that after graduation I would work on biochemical research related to medicine. However, I received an offer to enter a Ph.D. program in Institute of Genetics and Selection of Industrial Microorganisms, the leading biotechnological and microbiological institution in Russia. This is how I became a microbiologist.

MSRC News: What are your current research interests?

AC: My current research interest is regulation of gene expression in bacteria. Gene expression is the set of molecular processes that a cell carries out to make a biologically functional polypeptide, or protein molecule. I guess this sounds remote from mainstream oceanography, but I disagree. The majority, if not all, important processes in the ocean, from biogeochemical cycles of biogenic elements to behavior of individual animals, are regulated at the genetic level. Up to this point in science, gene expression has been studied in laboratory and on laboratory organisms: we know a lot about steps of regulation of various cellular processes for several bacteria, yeasts, nematodes, insects, plants and mammals. But understanding how gene regulation occurs in nature and what role an organism's environmental conditions play in the regulation is far from known. The ocean offers unlimited ways to study regulation of gene expression in situ.

MSRC News: What projects are you working on in oceanographic microbial ecology?

AC: A big interest for me is studying the ways marine organisms metabolize a group of chemicals called methylated amines. These amines are important as osmolytes in bacteria, plants and animals, helping them regulate their chemical environment. Aerobically methylated amines are metabolized in a sequence of steps by methylotrophic bacteria, with which I've been working my whole career. Approximately eight to 10 known enzymes are involved in all those processes. Only one, methylamine dehydrogenase, is well studied -- others have been studied just a little or not at all. Therefore, one thing which I would like to do is to study these enzymes. Cloning of the genes for enzymes of methylated metabolism would allow us to develop molecular probes. These probes will be used to study ecology of methylated amine metabolism. It is worth noting that amine oxidizing bacteria are ubiquitous in coastal environments and usually are associated with kelp and eel grass beds, and salt marshes. It will be interesting to see how amine oxidizing enzymes are distributed and expressed depending on season, type of ecological niche, primary production, input of nutrients, etc.

MSRC News: Are you collaborating with any MSRC faculty?

AC: I am currently working on molecular microbial ecology of Cariaco Basin off Venezuela with Mary Scranton and Gordon Taylor. Below about 280 meters, the water in the basin has essentially no oxygen. Thus, we expect to observe at least three distinct microbial populations in the basin: aerobic, or those that depend on oxygen, anaerobic, or those that do without oxygen, and those that live at the interface between the oxic and anoxic layers. The first goal of the project is to catalog microorganisms present at different depths. Second, we want to identify which microbes are important to the biogeochemical processes in the basin. We will do this by correlating the processes we observe with the presence and number of microorganisms able to carry out these processes. Third, we want to measure levels of expression of each group of enzymes responsible for major biogeochemical processes. Finally, we hope to correlate dynamics of changes in microbiological communities with global oceanic and surface processes.

Another interesting project I plan to work on is development of a sensor system for identification and quantification of bacteria in environmental, and in the future, clinical samples. My collaborators in this project are Paul Kemp, Josie Aller and Bob Aller. We have chosen to start with the pathogenic bacterium Vibrio vulnificus , which is associated with seafood and causes septicemia, (blood poisoning) in some patients with lethality up to 40 percent . Existing methods to identify this bacterium are time consuming and frequently not sensitive enough. The idea behind the new method is to use fiber-optic equipment to quantify a reaction of the bacterium's genetic material called DNA-DNA hybridization.

MSRC News: What are some of your other interests?

AC: I have many other interests. At some point I would like to broaden the scope of my research beyond microbiology. For example, I like fish. I like to go fishing. I like to observe fish. I like to eat fish. I have even an aquarium with goldfish in my lab -- they're my pets. And, therefore, I've always been interested in getting involved in transgenic fish studies. Transgenic animals are those that have had genes introduced into them for a specific purpose. One of my ideas is to create a transgenic fish with a reporter gene that could be used to assess mutagenic properties of water contaminants. This transgenic fish could be put into a polluted and potentially mutagenic environment such as the Hudson River. The level of mutagenic damage to the reporter gene can be measured by measuring the activity of the protein encoded by the reporter gene. This would tell us something about how a toxic environment affects the fish that live in it.

MSRC News: Switching gears, what do you see as the differences in the research and funding systems among the United States, former Soviet Union, and Russian system in the post-Soviet era?

AC: In the Soviet Union it was a completely different system which I think was justified and worked fine due to limited resources. The process of peer review [of grant applications] was absent completely. This is how it worked: the small amount of resources was distributed among members of the Academy of Science, who were usually directors of big scientific institutions or University departments. Then those directors, based on their discretionary decision or sometimes consulting with leading scientists in their own institutions, distributed funds inside their institutes. The closer an institute director was to the ruling Communist Party elite the more money his institution got.

Now Russia is trying to imitate the United States. They have introduced a grant system which I think at this moment leads to a further deterioration of science in Russia. Internal resources are even more scarce than they use to be during the Soviet Union and they are trying to distribute them now to a bigger number of people. Substantial scientific funding comes to Russia from the United States and particularly Western Europe. Usually they require some kind of Russian-Western collaboration. As a result most of these grants go to a few Russian scientists who traveled to the west during the Soviet time and know people here. This is one reason why there is no new blood coming into Russian science. The majority of Russian scientists of younger and intermediate age try to move to the U.S. and Western Europe, Japan, Taiwan, Australia, even Latin America: any place that has a better standard of living for scientists.

MSRC News: What do you see for the future of Russian science?

AC: I think that the situation with Russian science will start to improve when the Russian economy is regulated again. Only then will the government be able to collect enough money to support science. Probably Russia needs her own Franklin Delano Roosevelt to turn her economy around.

Colloquium Explores Environmental Change

Prominent international, national and local experts explored the "Human Dimensions of Environmental Change," at a two-day conference sponsored by the Marine Sciences Research Center, last spring. The conference was part of the State Unviversity of New York at Stony Brook's 40th Anniversary celebration.

"From climate change to possible causes of breast cancer, the environment affects each of us," said Marine Sciences Research Center (MSRC) Dean and Director Marvin Geller, who organized the colloquium. "This conference is unique in bringing together distinguished international figures as well as national and local experts to discuss what environmental change actually means."

Faculty and Staff News

As MSRC moves forward into the 21st-century, the Center will hire several new faculty members. It is anticipated that the first three positions to be filled in the 1998-1999 academic year will be in physical oceanography, synoptic meteorology and atmospheric dynamics. In the following two academic years, MSRC plans to add five more faculty positions. Keep posted with MSRC's Website: http://www.msrc.sunysb.edu.

The faculty and staff congratulate MSRC scientist **Robert Cowen** on his appointment as the first Maytag Chair of Ichthyology, Rosenstiel School of Marine and Atmospheric Sciences, University of Miami. He will continue his research on fishery oceanography, larval ecology, and the ecology of fishes, while **Su Sponaugle** carries on her research at Rosenstiel into the recruitment and early life history of marine reef fishes and invertebrates. We regret their departure from Stony Brook but look forward to rich collaborations in the future.

Marine Sciences Research Center Dean and Director **Marvin Geller** is the new president-elect of the 4,000-member Atmospheric Sciences Section of the American Geophysical Union (AGU). Dr. Geller will be president-elect of the Atmospheric Sciences Section for two years from July 1, 1998 to July 1, 2000; he will then be section president for two years. Section heads are voting members of the Council, which is the governing body of the AGU. The Council sets policy for the entire AGU and determines the scope of its programs. Atmospheric Sciences is the fastest-growing AGU section.

MSRC welcomes **Stephen J. Cluett**, the new captain of the ONRUST, the Center's research vessel. Cluett, 44, was captain of a New York State Department of Environmental Conservation

vessel in the Great Lakes for 13 years before coming to Stony Brook. Before that, he was a commercial fisherman, trawling and sword fishing in the waters off southern New England. He has a degree in biology from Northeastern University. While attending college, Cluett worked for the National Marine Fisheries Service in Connecticut and Rhode Island.

Recent Graduates

Ph.D.

Marci Lynn Bortman
R. Lawrence Swanson
An assessment of the relationship between water quality and land-based sources of sewage in a tropical system

Jeffrey A. Buckel
David Conover
Impacts of bluefish Pomatomus saltatrix predation on estuarine and continental shelf fishes

Chi-shao Chen
Dong-Ping Wang
Model study on circulation in the Santa Barbara Channel.

Nancy Craig
Glenn Lopez
Population level control on particle and solute transport processes in an intertidal sand flat: impacts on resource availability in a dense assemblage of the deep head down deposit-feeding polychaete *Clymenella torquata*.

Sidney J. Fauria
Dong-Ping Wang
Analysis of nearsurface inertial motion in the latex area

Huan Feng
J. Kirk Cochran
Natural radionuclides as tracers for behavior, transport and fate of particle-associated contaminants in the Hudson River Estuary

John Jaeger
Charles A. Nittrouer
Sediment accumulation along a glacially impacted mountainous coastline: South Central Alaska.

Silvio Pantoja
Cindy Lee

Reactivity of proteins, peptides and amino acids in the marine environment: effects of molecular size and structure on degradation

Christopher Kemp Sommerfield
Charles A. Nittrouer
A radionuclide and geochemical investigation of the sediments and sedimentation on the Eel River Continental Margin, northern California

Xiaodu Jing
Robert D. Cess
Analysis of clear sky surface insolation in Canada: observations versus calculations and amino acids in coastal marine sediments.

M.S.

Leslie S. Adler-Ivanbrook
Vincent Breslin
Leaching of copper, chromiun and arsenic from CCA treated lumber and uptake in a non-target special Mytilus edvlis

Heather M. Bittner
Roger Flood
In-situ classification of Port Jefferson harbor sediments using a dynamic probe penetrometer

Elizabeth A. Braga
Jeannette Yen
Phylogemy of the copepod family Euchaetidae inferred from 16S and 28S DNA sequences

Eric R. Breuer
Sergio Sañudo-Wilhelmy
The distribution of trace metals in the Peconic River Estuary during a brown tide bloom

Jennifer L. Ericsson
Henry Bokuniewicz
Hydrography of West Meadow Creek - Stony Brook, NY

Anitra E. Ingalls
Cindy Lee/Robert Aller
The influence of macrofauna on chlorophyll-a degradation in coastal marine sediments

Bing Jin
Vincent Breslin
Investigation of the sorption characteristics of volatile organic compounds VOCs by waste polymer

Laura E. Klahre
David O. Conover
Countergradient variation in egg production rate of the Atlantic silverside Menidia menidia

Gabriel J. Kra
John E. Mak
Stable isotopes of carbon monoxide at Montauk Point, Long Island

David E. Laby
V. Monica Bricelj
Toxin kinetics and behavioral responses of the surf clam, Spasula solidissima, and softshell clam *Mya arenaria*, fed *Alexandrium* spp.

James M. Lodge
Henry Bokuniewicz
A model of the tributary sediment input to the Hudson River Estuary

Nicole S. Metzger
Henry J. Bokuniewicz
Water properties in Ambrose Channel

Daniel B. Montlucon
Cindy Lee
Mechanisms controlling adsorption capacity of Flax Pond sediments

Paul F. Mucciarone
R. Lawrence Swanson
A theoretical assessment of the dispersion of pulped solid waste effluent from U.S. Navy ships operating in the wider Caribbean special area during Operation Uphold Democracy

Stephan B. Munch
David Conover
Recruitment dynamics of young of the year bluefish, *Pomatomus saltatrix*, from Cape Fear to Cape Cod, 1973-1995

Sarah G. Newkirk
Valrie Gerard
Cold adaptation in arctic macroalgae

Robert J. Quinn
R. Lawrence Swanson
The role of science leading to the passage of the Ocean Dumping Ban Act

Zhixiong Shi
Duane Waliser
Assessment of the Hadley and Walker circulation variability in the NCEP/NCAR reanalysis

Brian P. Steves
Robert Cowen
Habitat preferences of juvenile groundfish on the continental shelf of the New York Bight

Benjamin B. Strong
Henry Bokuniewicz
Shoreline Trends from 1950-1995 on Jones Beach, Long Island

John P. Walsh
Charles Nittrouer
Observations of sediment flux to the Eel continental slope, northern California

Luqiang Xu
Cindy Lee
The distribution of pigments, amino acids and amino sugars in plankton, suspended and sinking particles, and sediments in the Arabian Sea

Min Yang
Sergio Sañudo-Wilhelmy
Seasonal variation of trace metals in the Hudson River Estuary

Jingguo Zhang
Roger Flood
Application of a model for deep sea evolution