

# CSAM NEWSLETTER

COLLEGE OF SCIENCE AND MATHEMATICS

*A Spectrum of Possibilities*

## EAES Drills Beneath the Sea Floor

by Sandra Passchier and Stefanie Brachfeld, Earth and Environmental Studies

**D**rs. Sandra Passchier and Stephanie Brachfeld (Earth and Environmental Studies) left for the Antarctica in early January for two month shipboard research expeditions. Both Passchier and Brachfeld will be recovering sediment samples from beneath the seafloor, but they will be on separate excursions on opposite coasts.

After a 29 hour plane travel, Dr. Sandra Passchier arrived in Wellington New Zealand on January 5th to board a ship, the Joides Resolution, an Integrated Ocean Drilling Program (IODP) research-drilling vessel. She joins a team of about 10 international researchers, 20 technicians and crew members funded by the NSF and the Consortium for Ocean Leadership. The first four days were spent in port in preparation for the expedition. On January 9<sup>th</sup>, the group began the seven day journey to the Wilkes Land margin off Antarctica's Eastern coast. This is Passchier's fifth excursion to Antarctica. The science team, called the sedimentologists, will work in two shifts: noon to midnight and midnight to noon.

Dr. Stefanie Brachfeld, who is making her seventh visit to Antarctica, is aboard the Nathaniel B. Palmer as part of a five-year National Science Foundation (NSF) and International Polar Year (IPY)-funded excursion examining abrupt environmental change in the Larsen Ice Shelf system. The vast ice-breaking ship de-

parted from Punta Arenas, Chili on Dec. 27. Moving at only 15 nautical miles per hour, it took approximately 5 days to arrive at their destination, where they will spend approximately two months at sea. Brachfeld and the team will recover sediment samples from the seafloor beneath a body of water where the Larsen Ice Shelf existed before collapsing in 2002. This is Brachfeld's fourth visit to the Larsen Ice Shelf and the first visit under this IPY grant. She plans to return for another excursion in 2012.

While Brachfeld's team is "coring" for sediment, a process used to recover long cylinders of soft mud, Passchier's team will be drilling 1,150 meters through the harder surface beneath the Wilkes Land margin. Both will recover sediments that will be analyzed to provide insight into how and when and why the environment has changed and predictors of what is to come.



Utilizing the "derrick", tower on the ship where the drill rig is located (pictured above), Passchier and her team will drill 5 holes up to more than

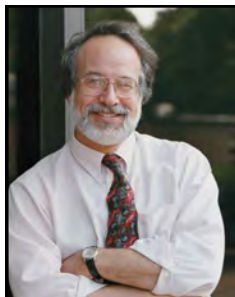
a kilometer deep on the Antarctic continental margin. The hope is to obtain information from sedimentary archives that will help them determine, among other things, the timing and nature of the onset of glaciation at the margin. Passchier said it is believed that the transition from green house to icehouse took place nearly 33 million years ago, impacting global sea level and oceanographic and biotic evolution, among other changes. She believes the drilling at the Wilkes Land margin, which has not been done before, will uncover the sedimentary archives they are seeking. Passchier will return to Montclair State and analyze the sediment samples she recovered in a lab on campus. Across the continent, Brachfeld explained that two sections completely collapsed in the mid-

*continued on page 5*

From Dean Prezant	p. 2
Advisory Council — Member Profile	p. 4
PSE&G Funds ISS	p. 4
Research With NY Blood Center	p. 5
Northern Exposure	p. 6
New Sokol Fellows Appointed	p. 6
Career Services Director Named	p. 7
MARC Students Attend Conference	p. 7
Three Years of 2009 NSF REU at MSU	p. 8
NASA's SARP	p. 9
Faculty News	p. 9
Student News	p. 10
Publications	p. 11
Upcoming Events	p. 12

## From Dean Prezant -

## CSAM into the New Millennium: A Brief State of the College Report



The first decade of the new millennium can be viewed through many lenses. Globally and nationally we have seen seemingly unending conflict, debate over the health and future of our global environment, discord over health legislation, and general economic turmoil. It has been in this milieu that the Col-

lege of Science and Mathematics at Montclair State University continues to evolve and, in spite of it all, to offer outstanding and continually improving and new education opportunities for our students. In fact, it is this challenging environment that affirms the absolute need for our programs to insure that our students are fully prepared to lead. The start of 2010 gives us a good reference point to reflect back and also to look forward as our College transcends into the next decade of this still new millennium. A good place to start is with the numbers, 10 years past and the present.

	1999	2009
Undergraduate enrollment	1,221	1,763
Graduate enrollment	269	384
Full time/Tenure track faculty	76	94***
External grant support	\$1,218,475**	\$3,869,242
Centers/Institutes	2	6
Program directors	5	12
Research lab square footage	9,995	22,830
Teaching lab square footage	25,869	27,504
Other CSAM square footage*	38,795	44,946
Graduate degree programs	6	12 + 6 combined
Graduate assistants	28	56

\*Does not include NJ School of Conservation or Bristol-Myers Squibb Center for Science Teaching and Learning.

\*\*Includes an NSF award to PRISM of \$817,293 for Great Ideas in Science program.

\*\*\*Represents a net gain accounting for hires, non-reappointments, retirements, and departures. Since 1999 there have been 61 faculty members newly hired into the College.

The numbers indicate not just isolated endpoints, but trends (the missing data of intervening years show a clear upward progression). In fact, the numerical trend continues as we look beyond the current numbers and see that by the start of the 2010 academic year we will likely have added another eight faculty members to CSAM bringing our faculty numbers above the 100 mark. We will also have grown our enrollment yet again. In addition, we have millions of dollars in grant proposals still in review for this academic year and faculty members have dozens of peer reviewed manuscripts in review and development. Our industry partners continue to support our strong and growing initiatives



in STEM education and sustainability (e.g. \$500,000 from Bristol-Myers Squibb; \$400,000 from PSE&G; Roche STEM Education Awards; Novartis Scholars; and numerous pharmaceutical companies contributions towards PharmFest; etc.). Add to the mix the over \$10M from the Margaret and Herman Sokol Estate, the largest single gift to Montclair



State University to date, that has allowed us to create the Sokol Institute and offer an array of fellowships and grant opportunities. The numbers are impressive but hardly tell the full story. The CSAM faculty has been hard at work and their efforts and creativity have placed our College in very good stead. In the past decade CSAM has built new

degree programs (PhD Environmental Management, EdD Mathematics Pedagogy/Mathematics Education, MS Molecular Biology, BS/MS Aquatic and Coastal Sciences, BS Information Technology, BS Science Informatics, MS Pharmaceutical Biochemistry, etc.) that make sense for our students, our region and our economy. Our College has developed outreach programs that have attracted recognition and support (Sokol Science Lectures, Visiting Scientist Program, etc.). We have partnered with industry to form strong links that enhance our programs and bring new opportunities to our students and the community (PharmFest, Novartis

Scholars, PSE&G Institute for Sustainability Studies, Roche Scholars, Bristol-Myers Squibb Center for Science Teaching and Learning, etc.). And we have grown our international links to extend from the Arctic to the Antarctic and from the Virgin Islands to Thailand. We have tripled our average annual external funding with awards from the National Science Foundation, National Oce-



anic and Atmospheric Administration, US Department of Education, US Geological Survey, National Institutes of Health, etc. and have supported pre-college students through an array of school visits and the ongoing (10 years) Weston Science Scholars Program. Our students have the benefit of the CSAM Residence Floor, CSAM Student Advisory Council, Science Professional Series, and recent NSF support for the Louis Stokes Alliance for Minority Participation in the Sciences program. In addition to the remarkable support to STEM teachers offered in our Bristol-Myers Squibb Center and PRISM (Professional Resources in Science and Mathematics) and joining the Center for Environmental Management and Analysis, CSAM is now home to the Passaic River Institute, The Institute for Sustainability Studies, the Margaret and Herman Sokol Institute for Pharmaceutical Life Sciences, an upgraded remote sensing lab, a Center for Imaging and Optics and a new electron microscopy suite. The remark-



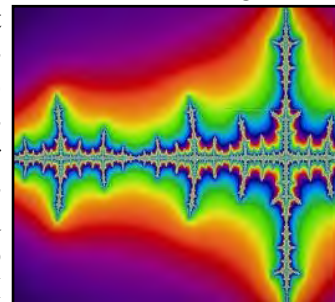
able success of our Health Careers Program continues unabated with expanded programs that have now entered New York schools. The New Jersey School of Conservation continues to educate thousands of school children in conservation and environmental studies while now hosting several faculty and student research projects. Most importantly, our students continue to thrive. Nurtured by an outstanding faculty and support staff, CSAM's current students and future alumni form a strong base for the New Jersey pharmaceutical industry (there are over 60 CSAM alumni working at Novartis alone!), business, technology, environmental, education, and health care communities. Multiply the number of our alumni who are scientists pursuing pharmaceutical research and drug discovery, computer scientists creating new directions in information technology, environmental scientists helping preserve and sustain our planet, and mathematics educators helping to insure that the next generation is prepared, and it becomes clear that CSAM has touched the lives of many thousands of individuals across the state and the country.

CSAM has also reached out to the campus at large and the surrounding community. While we are looking forward to our 14<sup>th</sup> Sokol Science Lecture, we reflect back on a history of popular seminars by such dignitaries as Oliver Sacks, Rita Colwell, Brian Greene, Nobel laureate Roald

Hoffman, Laurie Garrett, and recently and in conjunction with the Coccia Institute for Italian American Studies, renowned physicist, Eugenio Coccia (no relation). And while we're name dropping, CSAM has awarded honorary doctorates of science to global leaders in science including President Obama's appointed Administrator for the Environmental Protection Agency Lisa Jackson (pictured with CSAM 2009 Outstanding Undergraduate students), oceanographer Sylvia Earle, Alan I. Leshner, Chief Executive Officer for the American Association for the Advancement of Science, and in May 2010 Nobel Laureate in Physiology or Medicine Dr. Richard Axel.



Our continued upward trends reflect the state of the College. In every critical arena, our faculty and staff have seen to it that we have not only kept our heads above the rising tide but in fact in many areas have piloted new directions. As our enrollment has grown, so too have grown our facilities and faculty number. We continually enhance our facilities to meet the needs of our research active faculty hires, recently creating new facilities for biophysical chemistry (the "laser lab"), neuroscience and cancer biology. As the importance and relevance of research programs to our student's education has grown, so too has the number of scholarly publications and external support grants. And as our student needs for opportunities outside of the classroom have grown, so too has our programmatic support and creativity in new outlets. In fact, the only thing that we have seen a negative trend in is fiscal support from the State. Our growth in enrollment, faculty, scholarship, institutes and centers, and new programs has all mandated ongoing plans for our new building, the Center for Environmental Life Sciences (CELS), scheduled to open its doors in September 2012. There's little doubt that as this trajectory continues to move upward, and even with planning for continued growth, it won't take long before the added 100,000 square feet of our new CELS will be insufficient and we will need to again start planning for additional facilities to support our students, faculty, and to accommodate programs and curricula that we have yet to dream. All within the CSAM *Spectrum of Possibilities!* ♦





## Advisory Council — Member Profile

*Editor's note: The following is part of a series which features a member of the CSAM Advisory Council.*

**D**r. Maria Webb, Vice President of Discovery Research at Ligand Pharmaceuticals in Cranbury NJ, has been a member of the CSAM Advisory Council since 2007. She has worked in the pharmaceutical industry since 1989 when she joined Bristol-Myers Squibb (BMS) in Lawrenceville, NJ to work in the Cardiovascular Pharmacology Department. Dr. Webb's lab focused on G-protein coupled receptors (GPCRs) where she and her team worked on several cardiovascular research projects that advanced to the clinic. Among these were thromboxane receptor antagonists, angiotensin receptor antagonists, and endothelin receptor antagonists. At BMS, Dr. Webb became interested in the underlying role of inflammation in cardiovascular disease and started working on chemokine and cytokine biology and signaling.



Nuclear hormone receptors, Ion Channels, Integrins, and others. The technology platform was used in collaborations with many companies including Roche, Celgene, ScheringPlough, Organon, GlaxoSmithKline, Daiichi, Takeda, BMS, Wyeth, Pharmacia and Upjohn. Pharmacopeia's discovery research technology and team was very successful at seeding pipelines, and today, the two most advanced compounds, a P38 kinase inhibitor and a CXCR2 antagonist, are in Phase 2 clinical trials with BMS and Schering-Plough (Merck).

Dr. Webb volunteers as a member of the Board of Directors for the Society of Biomolecular Screening. She is a consultant at Mount Sinai School of Medicine for the Technology Development Fund, and was an advisor to the Sino-American Pharmaceutical Association in 2000-2002. She also serves as a guest editor and peer reviewer for journals, and has co-authored 90 papers.

In addition to working in "big Pharma", Dr. Webb worked for 12 years at Pharmacopeia, Inc., a small biotech company in Cranbury NJ from 1996 to 2008. Pharmacopeia was founded around combinatorial chemistry and ultra high-throughput screening technology. Dr. Webb and her team implemented and used this technology to discover Hits for many disease relevant targets such as GPCRs, Kinases,

Dr. Webb's academic education and training began at Montclair State College in 1973 as a Biology major. During her college years, Dr. Webb was both an athlete and a scholar. She was active in MSU's varsity athletics participating on the basketball and softball teams, and co-captained the softball team in 1977. She was known by her teammates to bring her copy of Guyton's Textbook of Medical Physiology on road-trips to study for Dr.

Shillcock's physiology exams! She received her B.A. in Biology in 1977 and began her studies at State College Pennsylvania toward her Ph.D. in Physiology from The Pennsylvania State University (PSU). At PSU, she worked on steroid receptor physiology and received her Ph.D. in Physiology in 1983. Dr. Webb did an NIH fellowship in Dr. Gerald Litwack's lab at Temple University Medical School on steroid receptor biochemistry, and in 1985, she moved to Hershey Medical Center of The Pennsylvania State University where she was a Research Assistant Professor working in steroid receptor regulation of gene transcription in the Department of Pharmacology.

While at Hershey, Dr. Webb became more interested in applied research in disease mechanisms and in preventive healthcare. These interests led her to the pharmaceutical industry and to a life-long love of physical activity and exercise. Her recreational pursuits are golf, scuba diving, jogging, weight lifting, Pilates, Yoga, and taking care of her 3 Freisian horses! Dr. Webb is also dedicated to the rescue and spay of feral cats and works with her partner of 30 years, Califon Animal Clinic, and Animal Alliance (animalalliance.nj.org) to help reduce the number of unwanted cats. Dr. Webb believes this will be her next calling. For now, Dr. Webb can be found at Ligand Pharmaceuticals in Cranbury NJ continuing her work in drug discovery. ♦

## PSE&G Funds ISS

*by Mike Weinstein, Institute for Sustainability Studies*

**A** gracious \$400,000 three year grant from PSEG Foundation has been granted to the Institute for Sustainability Studies (ISS) for its first three year's activities. An early task in the grant is to host a major international symposium on sustainability science and related subjects. Scheduled for October 24-27, 2010, leading international scientists, policy makers and decision makers will address the sustainability challenge in seven thematic areas: Managing the Earth's Life Support Systems; The Emergence of Sustainability Science; Balancing Ecology and Economy; The Value of Natural Capital and

the Quality of Life; From Science to Policy: Ecosystem-Based Management and the Coastal Continuum; The Coastal Commons and the Ecology of Cities; Restoring and Rehabilitating Ecosystems: Return from the Precipice; and Achieving the Sustainability Transition: Social Responsibility and Social Learning; Where do we go from Here?

Located in the midst of one of the world's great urban centers, the Institute is positioned to expand the University's traditional role in environmental management research and education into a transdisci-

plinary (cross-disciplinary) curriculum that addresses national, regional, and place-based sustainability issues.

The Institute for Sustainability Studies (ISS) was founded in 2009 to play a transformative role in bringing sustainability science research, education and outreach to the region. Its mission is to: Conduct research, education and outreach and to balance conservation of earth's life support systems with their production of sustainable goods and services for human well-being, now and in the future. ♦

## Collaborative Parasitology Research With NY Blood Center

by John Siekierka, Sokol Institute for Pharmaceutical Life Sciences

The Sokol Institute of Pharmaceutical Life Sciences at Montclair State University has as part of its mission statement, “to bring a global perspective to its research with the study of disease mechanisms and therapeutic approaches for AIDS, malaria, and other important global health issues.” My research group has been studying the biochemistry of stress responses in parasites, i.e. the biochemical mechanisms required for the parasite to deal with complex environmental changes and protection from host anti-parasitic responses. Inhibition of these responses has been shown to interfere with the ability of parasites to establish infection. I, along with lab members Dr. Ronald Goldberg, Akruti Patel, Katie Gaskill, Agnieszka Chojnowski, Areej Belal and Ally Bress have been studying the disease, lymphatic filariasis (or elephantiasis), which is caused by a group of mosquito-borne nematode parasites. Lymphatic filariasis is a major neglected disease with an estimated 120 million individuals infected and approximately 1.5 billion at risk in endemic regions. It is a highly disfiguring and debilitating disease and one of the major causes of global morbidity.



Figure 1A

We are studying the parasitic nematode, *Brugia malayi*, which is the main cause of lymphatic filariasis in South and Southeast Asia (Fig 1. A & B).

Using genetic information from the published genome sequence, we have identified an enzyme expressed in *B. malayi* which is closely related to a human enzyme known to play an important role in human responses to stress such as caused by toxins, infection, oxidative and UV-induced stress and inflammation. A similar enzyme is expressed in the non-parasitic nematode *C. elegans* and has been shown using genetic means to be involved in protecting the worm from a variety of environmental and other stresses. Based on these observations we hypothesized that the *B. malayi* enzyme is also important in protecting the parasite from stress and that inhibiting its activity may be deleterious to the parasite.

In order to demonstrate this, we have produced recombinant enzyme, characterized it and through screening, identified potent inhibitors from our

compound library which inactivate it.

What do these inhibitors (drugs) do to the parasite? Here we completely change our “hats” and became parasitologists. We have been working with Dr. Sara Lustigman, Head, Laboratory of Molecular Parasitology at the New York Blood Center in Manhattan. Dr. Lustigman is a world renowned parasitologist and one of the members of the team who sequenced the *B. malayi* genome. Dr. Lustigman has studied the biology of a number of nematode parasites responsible for lymphatic filariasis and onchocerciasis (i.e. River Blindness). Akruti Patel, a graduate student in my group, and I worked for several weeks with Dr. Lustigman and her group at the New York Blood Center, learning



Figure 1B

parasite culturing techniques, parasite dissection and phenotyping. Akruti has identified a number of parasitic processes that appear to be affected by our inhibitors and is continuing to work on better defining the biochemistry of these processes here in our laboratory at CSAM. Our hope is that our efforts will lead to a better understanding of the biology and biochemistry of *B. malayi* and offer new insights into new ways to treat this terrible disease.

♦

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1990's and another part, which was about the size of Connecticut, collapsed in 2002. One piece of the shelf still remains. Sedimentary records will be used to establish 'normal' patterns of variability, determine if these ice shelves have collapsed in the past, and understand what causes ice shelves to collapse. Understanding the behavior and history of ice shelves

may help scientists predict what the Antarctic Ice Sheet will do in the future in response to global warming. Her preliminary sample analysis will be done on the ship, but most of the archives will be sent to the Antarctica Marine Geology Research Facility at Florida State University in Tallahassee, and sub-samples will be brought back to Montclair State where they will take months to analyze.

The progress of Dr. Passchier's expedition can be followed on [www.msuinantarctica.blogspot.com](http://www.msuinantarctica.blogspot.com). She reports that the team is “getting excited, but it is still a bit unreal: it is Summer in New Zealand, with temperatures in the 70's (20 degrees C), and we are at the coldest place on Earth.” ♦

## Northern Exposure

by Mark Chopping, *Earth and Environmental Studies*

The Arctic is an enormous area, sprawling over one sixth of the Earth's landmass – more than 30 million km<sup>2</sup> – and it is changing rapidly. Changes in temperature, hydrologic cycling, and matter and energy exchanges with the atmosphere are happening more rapidly in northern high latitudes than anywhere else because of positive feedbacks from the retreat of ice and snow – and Arctic ecosystems are especially sensitive to climate change because they exist near the freezing point of water. One result is shrub expansion in the extensive grass-dominated tundra biomes of Alaska, Canada, Russia, and Northern Europe. Shrubs are capable of much more rapid expansion than trees, so mapping shrub abundance is important.

Our project, funded by a \$500,000 NASA grant, addresses this using sat-

ellite remote sensing. Arctic vegetation maps are usually based on remotely-sensed spectral metrics that reflect a combination of vegetation cover, photosynthetic activity, foliage depth, canopy architecture, and soil color and brightness. Our approach is different: it seeks to exploit the structural signals in data from orbiting NASA Earth Observing System instruments (MISR and MODIS) that cover large areas regularly.

The application of remote sensing requires information acquired on the ground for calibration and validation, so in August 2009 we performed field visits to alpine tundra (pictured left) and held discussions with our co-investigator Ken Tape, a PhD student Institute of Arctic Biology at the University of Alaska, Fair-

banks. We acquired detailed aerial photographs for a number of sites on



the North Slope, and in late August a small team led by Ken visited the sites to acquire a photographic record of surface conditions,

including one site that was part of the massive Anaktuvuk fire that raged across the tundra in 2007, at ~347 square miles the largest ever recorded in Alaska (pictured above). The team is led by Mark Chopping and includes PhD students at Montclair State University (Rocio Duchesne Onoro) and Boston University (Zhuosen Wang), a post-doc at University of Alaska, Fairbanks (Ken Tape), and collaborators at other institutions (Scott Polar Research Institute, UK; US Geological Survey Alaska Science Center, Anchorage). ♦



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## New Sokol Fellows Appointed

The Margaret and Herman Sokol Institute for Pharmaceutical Life Sciences supports trans-disciplinary research among College of Science and Mathematics faculty, students, and academic and industry collaborators in the areas of medicinal chemistry, pharmacology, biochemistry, natural products chemistry, molecular biology, computational sciences, environmental toxicology and pharmacology, and new emerging technologies such as biomaterials and nanotechnology. Proposals are solicited yearly and successful applicants receive funding for a period of two years to conduct their research. Two new Sokol Fellowships have been awarded last September. The first program selected is entitled, “A computational study on ligand binding with G protein-coupled receptors (GPCRs)”, by Dr. **Dajin Wang** and Dr. **Jing Peng** of the Department of Computer Science, and Dr. **Charles Du** of the Department of Biology and Molecular Biology. The second program selected is entitled, “Nanocarrier Based Novel Drug Delivery System for Breast Cancer” by Dr. **Shifeng Hou** of the Department of Chemistry and Biochemistry and Dr. **Reginald Halaby** of the Department of Biology and Molecular Biology. These new programs bring to four the number of trans-disciplinary research programs funded by the Sokol Institute. Congratulations to our new Institute Fellows. ♦



## Career Services Director Named

**M**s. **Gennae Hinson** joins the College of Science and Mathematics (CSAM) as the Director for Career Services, a newly created position within the Dean's Office. Gennae brings over 10 years experience in events planning, academic advising and career counseling. She has served the University in a variety of roles including Academic Advisor for the Center for Academic Advising and Adult Learning, Recruitment Coordinator with the Graduate School, and Admissions Counselor with the Office of Undergraduate Admissions. Gennae earned her B.A. in Sociology and M.A. in Counseling at Montclair State University. As an alumna, she's

a dedicated professional and passionate about assisting students in helping them to reach their career goals.

Gennae will be serving CSAM by providing comprehensive career counseling, internship placement, and job readiness training for all students. She will conduct workshops for students on the career development phase including: resume writing, interviewing tech-



niques, and job searches. She will also serve as a resource to all faculty by assisting students secure cooperative education, internship and job placement.

We enthusiastically welcome Gennae to further promote the career success of all CSAM students!

Gennae's office will be located in Richardson 236 with office hours as follows:

Monday: 9:00a.m.-5:00p.m.

Tuesday: 9:00a.m.-5:00p.m.

Wednesday: 10:30a.m.-6:30p.m.

Thursday: 9:00a.m.-5:00p.m.

Friday: 9:00a.m.-5:00p.m. ♦

## MARC U-STAR Trainees Present at Conference

*by Reginald Halaby, Biology and Molecular Biology*

**M**ARC U-STAR trainees presented their research at the recent 2009 Annual Biomedical Research Conference for Minority Students, in Phoenix, AZ. All nine of our MARC students attended the conference, seven of whom had posters that were accepted for presentation. This was an excellent showing for Montclair State University at a conference that included students from over 285 US colleges and universities; over 850 faculty and administrators; and 1,500 undergraduates. Of note, Steve Arrieta, one of our junior MARC students, was awarded a prize for his poster in the Social and Behavioral Sciences.

The presentations were as follows:

**Javier Bustamante** (Psychology major; MARC Mentor: Dr. Milton Fuentes) presented a poster entitled, "The Multicultural Psychology Scholars Program: Recruiting and Retaining Ethnic Minority Psychology Majors."

**Franklin Paulino** (Biochemistry major; MARC Mentor: Dr. Hans Schelvis), presented a poster entitled, "Fingerprinting DNA Damage." (pictured at right)

**Steve Arrieta** (Psychology major; MARC Mentor: Dr. Milton Fuentes) presented a



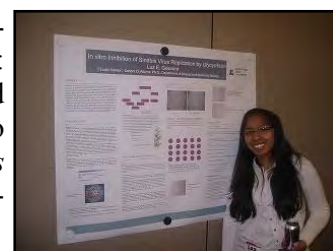
poster entitled, "Is It Rape? Examining Effects Of Sexual Orientation On Attitudes Toward Date Rape."

**Iris Gomez** (Biology major; MARC Mentor: Dr. James Dyer) presented a poster entitled, "Optimization of Expression and Purification of Acetoacetyl CoA Thiolase from Sunflower Cotyledon."

**Jairo Sierra** (Biology major; MARC Mentor: Dr. Lisa Hazard) presented a poster entitled, "Suppression of GRM1 expression in a human melanoma cell line by siRNA in an ecdysone regulated system."

**Jean-Edson Belcourt** (Molecular Biology major; MARC Mentor: Dr. Dirk Vanderklein) presented a poster entitled, "The Impact of Defoliation on Starch Reserves of Japanese barberry."

**Luz Guevara** (Molecular Biology major; MARC Mentor: Dr. Sandra Adams) presented a poster entitled, "In Vitro Inhibition of Sindbis Virus Replication by Glycyrrhizin." (pictured at right.) ♦



## Three Years of 2009 NSF REU at Montclair State University

by Stefan A. Robila, Computer Science

With support from the Department of Defense (under Awards to Stimulate Undergraduate Research Experiences - Assure) and the National Science Foundation (under Research Experience for Undergraduates – REU),



the Department of Computer Science and the Center of Imaging and Optics at Montclair State University organized the third 8-week intensive undergraduate summer research program where students worked individually and collaboratively on a wide variety of computing problems. The program, titled 'iMagine – REU in Imaging and Computer Vision' attracted a strong pool of over 60 applicants from which eight were selected representing a wide variety of schools: Albany State University, Cornell College, Delaware State University, Iona College, Oberlin College, St. Lawrence University and Montclair State University.

The students were housed in the Village at Little Falls and were employed full time in the research projects. The goal



of the REU programs is to expose students to the experience of performing research and encourage them in pursuing research careers. At MSU, they worked on a diverse set of projects supervised by faculty from the Computer Science Department: object recognition and tracking in LIDAR imagery (advisor Jing Peng), efficient hyperspectral data visualization (advisor Angel Gutierrez), data mining for nanotechnology images (advisor Aparna Varde), and hyperspectral face recognition (advisor Stefan Robila). Apart from weekly updates and meetings, they also presented their work at a mid-period workshop and in the final week. Each student delivered a final project report and presentation. It is also expected that some of their work will be presented in national and international professional meetings. Up to date, work generated in the REU program included five student co-authored conference papers, numerous research posters and clubs and class presentations.

In addition to the individual research projects, the REU cohort participated in a series of adjunct activities intended to enrich the student's educational and research experiences. To ensure that an appropriate background is achieved, the 2009 cohort attended workshops and seminars in image processing, web design and development, Matlab, research process and industrial research. Drs. Katherine Herbert and Stefan Robila provided an overview of the graduate school opportunities in computing sciences. Strategies for a successful application process and sources of funding were discussed as well as approaches to attract funding for the graduate studies. Finally, a weekly research methods session was held each Thursday afternoon. As in the previous summer, REU participants traveled to various New Jersey companies specializing in video and image processing and computer vision. Thus, the participants had the unique opportunity to interact with world class researchers and developers. Each activity was evaluated through assessment surveys with the results being used to shape future initiatives.



The 2009 iMagine REU site has been a success, establishing a tradition of REU programs at Montclair. Its impact on the participants will be assessed in the coming years when the students will complete their studies and pursue their future careers. Of the 24 students that have attended the program in the last three years 15 have already graduated, half of them choosing to continue their studies through graduate degrees, the other half being employed with companies such as Raytheon, Microsoft, Sogeti, or Fast Enterprises.

Contingent upon expected award from NSF, a new summer program is being planned for 2010 as a result of a renewal proposal submitted to the National Science Foundation. Information on the new program will be available online and recruitment will start shortly. ♦





## NASA's Student Airborne Research Program (SARP)

by Sagarika Roy, Environmental Management PhD candidate

I participated in NASA's Student Airborne Research program (SARP) scheduled for the period of July 6 to August 14, 2009 in California, along with undergraduate and graduate students from other universities across the US. We had a diverse background of students on the team, with expertise ranging from Atmospheric Science, Earth Science, Engineering to Biology, Mathematics, Physics and Chemistry.

The program began at home institutions, where the participating mission faculty and NSERC staff provided relevant reading assignments and two teleconferences. The following weeks, we attended lectures on various aspects of Earth Science and airborne science from university faculty members, research institutions and NASA scientists at the University of California, Irvine. One of the speakers was Sherwood Rowland of the University of California, Irvine, a Nobel Laureate in chemistry, and a long-time user of NASA's DC-8 airborne capabilities for his research on atmospheric chemistry.

The DC-8 flying laboratory is based at NASA's Dryden Aircraft Operations Facility in Palmdale, California. We took a rare behind-the-scenes look at instrument integration, flight planning and payload testing that is the basis of every successful Earth Science airborne campaign carried out by NASA. These airborne research campaigns play a pivotal role in the calibration and validation of NASA's space-borne Earth observations, remote sensing measure-

ments and the high-resolution imagery for Earth system science. Two instruments namely, MODIS/ASTER Simulator (MASTER), and Whole Air Sampler (WAS) were onboard DC-8 to collect airborne measurements. MASTER, which is a multispectral remote sensing imager, is used to study algal bloom in Monterey Bay and to collect data from Sacramento-San Joaquin delta for agricultural processes. WAS is used to collect air samples at various location and elevations, and analyze them for chemical content.



We were divided into the investigative groups of atmospheric science, algal blooms and agricultural processes. This was a once-in-a-lifetime opportunity to fly aboard one of two six-hour DC-8 flights departing from NASA's Palmdale facility. The aircraft travelled north over the San Joaquin Valley for an air-quality investigation, over the Sacramento-San Joaquin River Delta to observe vegetation, and south over Monterey Bay to research algae blooms. With the images collected, each student had to analyze the data. I had to estimate the evapotranspiration of almond orchards using Surface Energy Balance Algorithms for Land (SEBAL) method.

I am grateful to Dr. Mark Chopping for his kind support in giving me the opportunity to learn and experience the airborne science research. Also, I am thankful to the PhD program in Environmental Management in Montclair State University. ♦

## Faculty News

**Dr. Lora Billings** (Department of Mathematical Sciences) was awarded a three year NIH grant in September for \$799,310, along with her Co-Principal Investigators, Derek Cummings at Johns Hopkins University and Leah Shaw at the College of William and Mary. The title of the grant is "Collaborative Research: Multi-scale modeling of infectious diseases in fluctuating environments-Prediction and control". She was elected to the advisory board of the SIAM Activity Group on Dynamical Systems (SIAG/DS). Her term is 2010-2012.

**Dr. Charles Du** (Biology and Molecular Biology) delivered an invited paper on the "Content, Distribution, and Time of Divergence of Helitron Transposable Elements in the B73 Maize Genome" at the International Plant & Animal Genome Conference, San Diego, CA.

**Dr. Lisa Hazard** (Biology and Molecular Biology) received an \$18,919 grant to study the "Impact of salinization on New Jersey amphibian populations: A physiological approach to water quality issues" by the New Jersey Water Resources Re-

search Institute. It will cover student salaries, travel, and some equipment/supplies. She also served as a judge for student papers for the Society for Integrative and Comparative Biology student awards, Division of Comparative Physiology and Biochemistry and as a referee this fall for *Western North American Naturalist*.

During the Fall of 2009, **Dr. Aihua Li** (Mathematical Sciences) reviewed three papers for *Mathematics Reviews* and refereed one paper for *Science in China - Series F: Information Science*. She was invited to give the fol-

lowing colloquium talks: "Tracing Space Points – A View of Discrete Time Series Modeling", presented at the School of Traffic and Transportation, Beijing Jiaotong University, July 2009; "Ladder Graphs", presented at Department of Mathematics, Beijing Jiaotong University, July 2009; "A Current Trend of College Mathematics Education in the United States: Mathematical Modeling in Classrooms," presented at Department of Mathematics and Mechanics, University of Science and Technology Beijing; and "Polynomial Solutions to Certain Diophantine Equations", presented at the Department of Mathematics and Mechanics, University of Science and Technology Beijing.

**Dr. Dibyendu Sarkar** (Earth and Environmental Studies) has been elected to ITRC's "Attenuation Processes for Metals and Radionuclides Team". He will represent New Jersey in the National team along with a NJDEP official. The ITRC, Interstate Technology and Regulatory Council, (<http://www.itrcweb.org>) is a state-led coalition organization whose membership comes from federal agencies, academia, environmental industries, public and tribal stakeholders, as well as state regulatory agencies. ITRC technical teams focus on innovative environmental technologies or methodologies in order to promote their successful application and eliminate regulatory barriers. Team products typically include technical and regulatory guidance documents and both internet-based and classroom training.

Over the first weekend of December, Drs. **A. David Trubatch** and **Philip Yecko** (Mathematical Sciences) and student **Matthew Vieira** (GK-12 fellow) traveled to the Advanced Photon Source (APS) to explore the proper ties of magnetic fluids (ferrofluids) with APS scientist Wah-Keat Lee. Because magnetic fluids are

opaque to visible light, the x-ray beam at APS was used to observe the motion of small particles and bubbles inside a ferrofluid. The bubbles and particles serve as probes to determine the viscosity changes of the fluid under a variable magnetic field. A weekend's worth of round-the-clock experiments resulted in several hundred gigabytes of images taken with a high-speed camera that will now be analyzed by the team. The APS "beam-time", awarded under a scientific review process under the auspices of the Argonne laboratory, were a follow up to a previous round of experiments performed by Lee, Trubatch and Yecko in December of 2008. Travel support for Vieira was provided by the Montclair GK-12 program and he will share his experience with his students at the Jefferson School in Lyndhurst.

Drs. **Michael Weinstein** (Institute for Sustainability Studies), and **Huan Feng** (Earth and Environmental Studies) visited the People's Republic of China during 8-15 December to present the results of the first three years of a joint research program with faculty and scientists at Tianjin University and the Tianjin Oceanic Administration. The project is part of an attempt to evaluate the hydrodynamics and fate and transport of contaminated sediments in western Bohai Bay and the Port of Tianjin to establish baseline understandings associated with China's 11<sup>th</sup> and 12<sup>th</sup> Five-Year Plans to expand the Port and fill nearly 3000 km<sup>2</sup> of the Bohai Bay shoreline to accommodate new development. To date, four manuscripts have been submitted or are in press from their joint research findings. Both MSU scientists presented seminars on this work, and Dr. Weinstein introduced MSU's new Institute for Sustainability Studies and its emerging programs. He also signed a four year

extension of a Memorandum of Un-



derstanding (pictured above) to conduct additional cooperative research and exchange programs, and to host bi-nation workshops and training sessions on Sustainability Science and Integrated Coastal Zone Management.

In November 2009, Dr. **Michael Weinstein** (Institute for Sustainability Studies) was the keynote speaker at the *Globalization and Sustainability: The World's Future* symposium co-sponsored by Brookdale International Education Center and the Brookdale College Action Team for Sustainability. ♦

## Student News

Supported by an NSF mini-grant, subcontracted with Brigham Young University, Drs. Li and Trubatch are leading a CURM team on MSU's campus. Six MSU math majors were selected to participate in the 2009/2010 academic year. At MSU the six students are:



**Rexford Acheampong, Jose Barrios, Matthew K. Cavanaugh, Kale J. Evans, Mirella Moawad, and Kaitlyn Murphy.** Kale and Jose

attended the AMS/MAA Joint National Meeting to be held in San Francisco on January 2010 and will participate in the MAA Undergraduate Poster Competition.

**Jose Barrios**, a math major, published a paper: "A Brief History of Elliptic Integral Addition Theorems", in *The Rose-Hulman Undergraduate Mathematics Journal*, Vol. 10, Issue 2, 2009. The paper was directed by Dr. Aihua Li

(Mathematical Sciences).

Undergraduate students **K. Kwasek** and **D. Vig** co-authored "Interspecific variation in behavioral aversion of amphibians to road deicers" and presented by Dr. **Lisa Hazard** (Biology and Molecular Biology) at the Society for Integrative and Comparative Biology Annual Meeting in Seattle, WA. ♦

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## Publications

**Antoniou, G.E., D. Michalopoulos, and P. Petratos**, Eds. (2009). *IEEE Proceedings International Conference of Computing in Engineering, Science and Information*. California State University Fullerton, 384 p.

Colin A., **J. Cutler**, A.J. Radcliffe, and L. Traldi (2010). "The interlace polynomial of forest". *Discrete Mathematics*, 310, pp. 31-36.

**Du, C.G.**, N. Fefelova, J. Caronna, L. He and H.K. Dooner (2009). "The polychromatic *Helitron* landscape of the maize genome. *Proceedings of the National Academies of Science USA*, 106, pp. 19916-19920

**Dyer J.H.**, A. Maina, I.D. Gomez, M. Cadet, S. Oeljeklaus and A.C. Schiedel (2009). "Cloning, expression and purification of an acetoacetyl CoA thiolase from sunflower cotyledon." *International Journal of Biological Science*, 5:7, pp. 736-44.

Forgoston, E., **L. Billings** and I.B. Schwartz (2009). "Accurate Time Series Prediction in Reduced Stochastic Epidemic Models." *Chaos*, 19, p. 043110.

**Hazard, L.C.**, D. She-manski, and K.A. Nagy (2010). "Nutritional quality of natural foods of juvenile and adult Desert Tortoises (*Gopherus agassizii*): Calcium, phosphorus and magnesium digestibility." *Journal of Herpetology*, 44:1, pp. 135-147.

**Li, A.** and **M. Munakata** (2009). "Building Mathematically." *Mathematics Teacher*, 103:1, p.14.

Maher, C., M. Mueller and **D. Yankewitz** (2009). "A comparison of fourth and sixth grade students' reasoning in solving strands of open-ended tasks." In M. Tzekaki, M. Kaldrimidou, & H. Sakonidis (Eds.) *Proceedings of the 33rd annual meeting of the International Group for the Psychology of Mathematics Education*, Thessaloniki, Greece, 4, pp. 73-80.

Mueller, M., **D. Yankewitz** and C. Maher (2009). "Challenging the laws of math". In M. Tzekaki, M. Kaldrimidou, and H. Sakonidis (Eds.) *Proceedings of the 33rd annual meeting of the International Group for the Psychology of Mathematics Education*, Thessaloniki, Greece, 4, pp. 153-160.

Mueller, M., **D. Yankewitz** and C. Maher (2009). "A framework for analyzing the collaborative construction of arguments and its interplay with agency." *Proceedings of the 31st annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Atlanta, Georgia: Georgia State University, 5, pp. 276-283.

Mueller, M., **D. Yankewitz** and C. Maher (2009). "Eliciting student reasoning through problem solving." *Proceedings of the 31st annual meeting of the North American Chapter of the International Group for the Psychology*

*of Mathematics Education*. Atlanta, Georgia: Georgia State University, 5, pp. 811-818.

**Thomas D.**, M. Weeder-mann, **L. Billings**, J. Hoffacker and R. Washington-Allen (2009). "When to Spray: A Time Scale Calculus Approach to Controlling the Impact of West Nile Virus." *Ecology and Society*, 14, article no. 21.

**Weinstein, M.P.** (2009). "The road ahead: the sustainability transition and coastal research." *Estuaries and Coasts* 32, pp. 1044-1053 (doi:10.1007/s12237-009-9221-5).

**Weinstein, M.P.**, S.Y. Litvin and V.G. Guida. (2009). "Essential fish habitat and wetland restoration success: a Tier III approach to the biochemical condition of the common mummichog, *Fundulus heteroclitus* in common reed, *Phragmites australis* and smooth cordgrass, *Spartina alterniflora* dominated salt marshes." *Estuaries and Coasts*. 32, pp. 1011-1022.

♦



## Upcoming Events

### PharmFest 2010

**P**harmFest 2010's theme will be "*Emerging Issues in...*" This year's event, scheduled for **April 12, 2010**, will feature a preconference workshop, keynote lunch speaker, and six panel sessions. Each session will be composed of a panel of area professionals and experts with a moderator. The morning preconference seminar deals with innovation and entrepreneurship facilitated by Dr. Brandon J. Price, Principal Consultant at Falcon Ridge Associates, Inc. An invitation has been extended to Dr. Julie Gerberding, former CDC director, and now director of Merck's vaccine business, as the luncheon speaker.

The six panel sessions dealing with *Emerging Issues in...* consist of:

**Green Pharma** - The "greening" of the industry, paths to sustained and environmentally sound practices. Julie Manley (American Chemical Society), Organizer

**Pharmacogenomics** - Probing the influence of genetic variation on drug response with an eye towards a drug's efficacy. John Siekierka (MSU), Organizer

**Veterans Issues** - Examines various issues facing our veterans and the response of the pharmaceutical industry. Beth Searing (HealthCare Institute of NJ), Organizer

**Preventative Medicine** - A panel examination of how we can better keep ourselves healthy. Avinandan Mukherjee (MSU), Organizer

**Global Health** - The emergence of swine flu as a pandemic has brought issues of global health to the forefront for this panel discussion. John Siekierka (MSU), Organizer

**Diverse Career Paths in Pharma** - Discusses various opportunities that exist and are emerging in pharma. Avinandan Mukherjee (MSU), Organizer ♦

### PRI Biennial Symposium

**T**he fourth Passaic River Symposium will be held on Tuesday, **June 22, 2010**. Organized by the Passaic River Institute, this year's meeting will focus on progress made in addressing problems, learning about new efforts, and discussing remaining challenges. The three previous symposia attracted nearly 300 participants each - this fourth symposium promises to be equally attractive.

The "Lower Passaic River Restoration Project" will be prominently featured in the Symposium, including the "Phase 1" sediment removal by the Diamond Alkali site and the "Focused Feasibility Study" addressing the lower 8 miles. Projects and issues in the upper River and tributary watersheds will also be examined.

Abstracts are sought for platform (oral) presentations and posters on any environmental issue relevant to the Passaic River Basin and nearby areas. Abstracts will be selected for presentation based on their technical and policy merit and relevance. The conference committee may request persons submitting abstracts for platform presentations to exhibit a poster if all platform slots are filled. Platform presentation length will be 15 minutes, including questions. A book of abstracts will be distributed at the conference and placed on the conference website following the conference.

Abstracts may be submitted via the web form linked to [www.csam.montclair.edu/pri/conferences](http://www.csam.montclair.edu/pri/conferences) no later than Wednesday, March 10, 2010.

Symposium web site: [www.csam.montclair.edu/pri/conferences](http://www.csam.montclair.edu/pri/conferences) ♦