SAN JOSÉ STATE UNIVERSITY College of Science

the scientist

science in the 21st century

VOLUME 13,ISSUE 3 FALL 2009 WWW.SCIENCE.SJSU.EDU

"This fall we have juggled furlough days, seen students struggle to find classes, and wrestled with the long-term implications the cuts in higher education will have for the future health of the university."

—Dr. J. Michael Parrish

IN THIS ISSUE

MESSAGE FROM THE DEAN | DR. J. MICHAEL PARRISH

Unless you have been on trek in the Himalayas for the last year, you have probably heard at length about the California State University system's budget challenges, and the implications they have had for our students, faculty, and staff. This fall we have juggled furlough days, seen students struggle to find classes, and wrestled with the long-term implications the cuts in higher education will have for the future health of the university. We also had another leadership change, with Provost Carmen Sigler retiring over the summer. Gerry Selter, who preceded me as Dean of the College of Science was appointed interim Provost in the spring and, following a national search, was recently named permanent Provost and Executive Vice President for Academic Affairs. Those of us in the College of Science are grateful to Gerry for taking on this role at such a critical time in the university's history, and I look forward to the opportunity to continue to work with him in the coming months.

It would be easy to bemoan our fiscal state, but I would rather write a few paragraphs addressing the steps we have been taking to help students succeed during this challenging time.

When it became evident last year that we would have unprecedented demand for classes in 2009, we started preparing students in the college for this change. All College of Science students were notified via email that they should meet with their advisors as soon as possible so that they could plan their fall schedules and have the advising holds lifted (we instituted mandatory advising in 2007 which requires each student to meet with their advisor each semester to ensure that they are on track in their academic progress). Students who had their holds lifted in a timely fashion and registered on or near their assigned registration dates were, for the most part, successful in obtaining the classes they needed for timely academic progress.

In the spring and throughout the summer, incoming transfer students attended the mandatory TIP (Transfer Information Program) seminars. At those meetings, the new Spartans had the opportunity to meet with Associate Dean Maureen Scharberg, department chairs, advisors and peer advisors from the departments and from the College of Science Advising Center to plan their academic schedules for the coming year. Even though the last TIP sessions took place after most other students had registered, this talented group of advisors were successful in helping students find a full schedule of classes.

Since we continue to admit record numbers of students while complying with enrollment caps instituted by the system, another effort has focused on helping students who have 90 or more academic units successfully graduate. Helping science students in this category has been a cooperative effort between Student Affairs and our college, and each successful graduate makes space for a new student eager to pursue a science degree.

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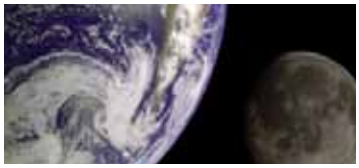

"Despite the budget situation, our faculty continue to be successful in obtaining external funding to maintain academic excellence."

—Dr. J. Michael Parrish

Continued from page 1

Another area of focus has been improving performance of students in our gatekeeper classes. After several years of successful workshops in the introductory chemistry courses, the Department of Mathematics has begun to institute optional workshops for students in the entry level math courses. So far, workshops are being offered for Pre-calculus (Math 19), Calculus I (Math 30), and Calculus II (Math 31). As is the case with programs in Chemistry and similar math workshops at other CSU campuses, students participating in these workshops to date have shown dramatically better performance (on average approximately one letter grade higher) than those not participating in the workshops.

Despite the budget situation, our faculty continue to be successful in obtaining external funding to maintain academic excellence. Thanks to funding from NIH, NSF, and the Howard Hughes Medical Institute, entry level courses in Biological Sciences, Chemistry, Computer Science, and Physics are currently being updated, and these same programs continue to provide unprecedented opportunities for College of Science undergraduates to participate in faculty-directed research. It probably goes without saying that higher education is more financially challenged than ever. We are always grateful for your support, but it is especially appreciated in these trying times.

—Dr. J. Michael Parrish
Dean, College of Science

SJSU HOSTS THE INTEL INTERNATIONAL SCIENCE AND ENGINEERING FAIR (ISEF) IN MAY 2010— JUDGES ARE NEEDED

Intel International Science and Engineering Fair (ISEF) 2010 - Call for Judges

- **The best young minds in the WORLD are coming to San Jose in May 2010 !!**
- **Over 1,500 top high school students from 53 countries**
- **We need your help to judge their advanced science and engineering projects (1,200+ projects)**
- **Judging Days are Tuesday, May 11 and Wednesday, May 12, 2010**
- **Judges qualifications: PhD, MD, or BA/BS/MS + 6 years professional experience.**
- **For information and judges application:**
  - **www.isef2010sanjose.org**

SAN JOSÉ STATE UNIVERSITY College of Science

biology
life in all its diverse forms

VOLUME 13,ISSUE 3 FALL 2009 WWW.BIOLOGY.SJSU.EDU

Ecology and evolution of plants on extreme substrates: In pursuit of California's geobotanical wonders

Rajakaruna on an asbestos mine tailing in Clear Creek Management Area, San Benito County. The area is home to several rare, serpentine endemic species.

Suzie Woolhouse (MS Candidate) approaching her study taxon, Monardella follettii, a rare plant found on serpentine soils in Plumas National Forest.

Nishanta "Nishi" Rajakaruna, Assistant Professor in Plant Biology, is a geobotanist with broad interests on plant life on unusual, often extreme, geologies and other substrates. His geobotanical explorations have taken him to Cuba, Italy, South Africa, Maine, and his homeland, Sri Lanka. Nishi's research focuses on the study of plants found on unusual substrates such as serpentinite (California's state rock), guano deposits, mine tailings, and many other edaphic anomalies found across California. Using plants of such unusual habitats as model organisms, Nishi explores factors and mechanisms responsible for the origin of new species and the assembly of California's rock outcrop plant communities. He is currently the co-editor of two key treatments on plant life on serpentine soils (Serpentine: A Model for Ecology and Evolution and Soil and Biota of Serpentine: A World View), both to be published in the coming year. He currently has four graduate students studying California's edaphic endemics, those species restricted to unusual substrates, and a team of undergraduates eagerly getting their hands dirty in 'ugly soils' across California!

Nishi was recently awarded two grants to pursue his research. One grant from the United States Forest Service ($405,000), is for research on the fire ecology and conservation biology of 12 rare plants of Plumas National Forest, some of which are restricted (endemic) to serpentine soils. With his collaborators, **Dr. Susan Harrison** (UC Davis) and her Ph.D. student **Erica Case**, Nishi and his MS student **Suzie Woolhouse** will be conducting a four-year study to generate useful information for effective conservation of these 12 rare taxa. Their study will compile existing information and gather new information to resolve important gaps in the knowledge of the biology and ecology of these rare taxa, their conservation status, and management needs. The area under study was recently affected by a forest fire providing opportunities to explore the role of fire on rare plants found on serpentine soils.

Nishi was also awarded a National Science Foundation grant ($30,000) for Rapid Response Research (RAPID) to explore if post-fire recruitment of chaparral shrubs is constrained by local adaptation to soils (serpentine vs sandstone) or microclimates (north vs south slopes). Fire plays a key role in the ecology of chaparral, or evergreen shrublands, an ecosystem unique to the five Mediterranean-climate regions of the world, including California. Seeds of many chaparral plants germinate only in the year after a fire, and so the age, reproduction, dispersal potential, and community composition of chaparral plants are controlled by the infrequent occurrence of fire, typically once every 1-10 decades.

Continued on page 4

Visiting research student Emma Dietrich (University of Rochester) watering recently transplanted seedlings.

Annette Bieger (UC Davis) and Dr. Rajakaruna measuring growth of transplanted seedlings at Walker Ridge, Lake County.

Continued from page 3

Quickly responding to a recent fire in Lake County, Nishi and his collaborators **Dr. Susan Harrison** and **Annette Bieger** (UC Davis), along with **Janis Strommen** (SJSU undergraduate), will test if three dominant chaparral shrub species of California and a native annual are locally adapted to the sites on which they are found.

Tests will be performed to determine if regeneration occurs only from seed produced on particular soil types (sandstone or serpentine) or on particular slope aspects (warm south-facing or cool north-facing), or whether seed produced in a particular habitat can successfully germinate and establish in other soil types or on slopes with different aspects. Results from this study will provide useful information for science-based management of California's unique chaparral ecosystems. This information will contribute to both the restoration of degraded chaparral and to the ability of resource managers to predict and plan for shifts in species distributions in response to climate change.

SEE MORE

While Nishi continues to generate external funding to explore California's geobotanical wonders, his students **Mike Fong**, **Suzie Woolhouse**, **Teri Barry**, and **Johann Zaroli** have also successfully pursued funding to follow their interests on California's native plants.

If you are interested in the amazing soil-plant relationship or how geology has shaped the botanical world around you, stop by Nishi's office in Duncan Hall 354.

—Dr. John Boothby

Research Labs

HUMAN ACTIVITIES AND ANIMAL LIFE

In the 1980's, research showing the effect of traffic noise on animal life garnered little attention. Now, the field of urban bioacoustics is growing fast, with studies showing how noise from human activities influences behavior of birds, whales and even frogs. My research looks at how noise from highways, power plants and other human sources may alter animal behavior. In particular, it is important to study how noise may disrupt mating such as the calls of birds and frogs. I also train biologists and environmental scientists in the tools and techniques used to broaden our understanding of the relationship between human noise and animal behavior.

—Beth Dawson, Ph.D

THE VAN HOVEN LAB: NEUROGENETICS

We study the molecular and genetic mechanisms by which neurons identify the correct partners and form appropriate synaptic connections during the development of the nervous system. We study the genetic model organism C. elegans, a microscopic roundworm, the only organism for which a complete synaptic connectivity map has been generated.

SEE VANHOVEN

—Miri VanHoven, Ph.D

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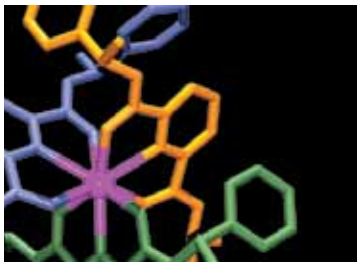


chemistry solutions

VOLUME 13,ISSUE 3 FALL 2009 WWW.CHEMISTRY.SJSU.EDU

Student News

Three MS Students **Anh Duong, Tane Boghozian, Hsiao-Chu Lin** completed their degrees in the Terrill Group in 2008/2009. In addition,**Yu-Chu Lu, Arthur Cheng and Weiling Hsieh** will complete their degrees this academic year! Current pursuits are in the areas of surface enhanced spectroscopy for biosensing applications and in carbon-nanotube based chemFET sensor devices for general chemical sensing objectives. Results of our research are presented annually at the national meeting of the Federation of Analytical Chemistry and Spectroscopy Societies. Dr. Terrill is working on publishing this backlog of Theses in the academic journals.

—Brad Stone

We have three outstanding members of our Theoretical/Computational research center: **Robin Schneider** is a Senior undergraduate in charge of our research into Acetyl/Butryl Cholinesterases, **Jared May i**s a Sophomore in charge of our research into the Caspase family of proteins, and **Dan Rose** is a Master's student who has been developing new theories and computational methodologies.

We are pleased to announce that Robin Schneider is pursuing a Doctoral degree in environmental chemistry at the Colorado School of Mines beginning in fall 2009.

—Thomas Young

Research Labs

THE THOMAS YOUNG LAB

My research focuses on the development and application of theories that can quantify the thermodynamics of the solvation of biological molecules based on molecular descriptions of the solvent water. This is relevant to the design and development of novel small molecule drugs for the treatment of a variety of diseases. Currently we are focusing our studies on the development of inhibitors for Acetyl/Butryl-cholinesterases and for the Caspase family of proteins. New inhibitors of these proteins could potentially treat Dementia, Alzheimer's disease and Cancer.

THE COLLINS LAB

There are currently two major research projects in my laboratory, both use biochemical and molecular methods to understand interaction between macromolecules. One involves the studying of actions of the nuclear receptor for the hormonal form of vitamin D in order to develop therapeutic agents for various diseases related to Vitamin D. The other project involves studying the interactions between Bovine Immunodeficiency Virus (BIV) RNA and BIV proteins. There are currently eight undergraduate students working on these projects in my laboratory.

Continued on page 6

Research

Continued from page 5

THE DARYL EGGERS LAB

The Eggers Laboratory investigates crowding and hydration effects on protein structure. Key biophysical methods employed by this group include sol-gel glass encapsulation, circular dichroism spectroscopy, and biocalorimetry. During the 2009 spring break, Daryl Eggers and three of his undergraduate research students participated in the USA-Mexico Workshop in Biological Chemistry in Mexico City. The workshop, subtitled "Multidisciplinary Approaches to Protein Folding," was hosted by Cinvestav, the Center of Research and Advanced Studies of the National Polytechnic of Mexico. In June 2009, Dr. Eggers attended the Gordon Research Conference on Proteins in Holderness, New Hampshire.

JOSEPH PESEK, MARIA MATYSKA-PESEK

While the development of new separation materials for chromatography continues to be the basic interest of our group, we have focused on metabolomics, the study of metabolites in living systems, over the last year. We have an NSF grant collaborating with the University of Tuebingen in Germany on NMR studies of separation materials, an NIH Grant collaborating with Monash University in Australia on metabolomics, an Agilent Foundation Grant to develop methods for the study of metabolites and a grant from the University of Queensland in Australia to work on new clinical analytical methods.

During the past year we have published seven papers. Our group consists of eight graduate students and four undergraduates. Invited presentations have been made at several international conferences and seminars have been given at 15 pharmaceutical/biotechnology companies around the world. We have just introduced a metabolomics chemical analysis kit marketed by Microsolv Technology, Eatontown NJ that utilizes the materials and techniques we have developed over the last several years.

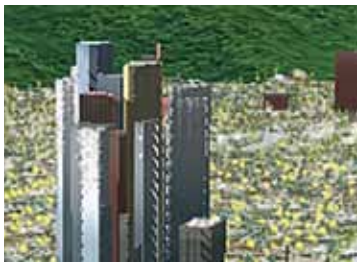
BROOKE LUSTIG

Dr. Lustig's research students Santhoshi Caringula (ChE) and Hema Lakkaraju (MSE/GenE) recently finished their thesis projects, where the former was involved in the computational characterization of protein-expressing domains from DNA hybridization. The latter, along with others in the group continued the development of computational/theoretical methods characterizing protein structural features by sequence homology-based methods (Arora, S., Kalakoti, S., Mishra, R., Do, S., Kantardjieff, K. and Lustig, B. Characterization of Protein Tertiary Contacts Using Homologt-Based Parameters, 2009, CSUPERB Syposium, A165). This work included a funded collaboration with our crystallographer colleague Professor Katherine Kantardjieff, of CSU, Fullerton.

WYNN RAY

Wynn Ray completed an M.S. in Chemistry under the direction of Professor Roger Terrill and continues to do research in surface plasmon resonance (SPR). He attended the "Surface Plasmon Photonics 4" conference in the Nederlands from June 21-26, 2009, in support of research into electronic control of SPR in thin metal films. Using DC and AC current to alter the refractive index of an electrochromic layer on the metal substrate, the SPR response is altered. Using patterned films and combinations of frequencies to create wave patterns in the plasmons, this can act as a Fresnel lens due to periodic variations in electron density.

—Dr. Brad Stone



computer science

makes the future happen

VOLUME 13,ISSUE 3 FALL 2009 WWW.CS.SJSU.EDU

Spotlight on Students

Members of the SJSU Computer Science ACM Programming Teams

For information about the SVG Open 2010 in Paris, France, go to **SVG**

CS 274 GRADUATE STUDENTS

Late May 2009, just after finals, seventeen of twenty-three graduate students attending Johnny Martin's CS 274 XML topics course decided it wasn't over, yet. These hard-working graduate students instead decided to keep on going while their peers relaxed. By May 31st, they submitted extended abstracts to SVG Open 2009, an international conference that was held on Google's Mountain View campus in October 2009.

A very special congratulations to graduate students **Nikolay Botev, Elena Kochetkova, Ashlesha Patil, Anh Trinh, Li Yang** for their full paper acceptances to SVG Open 2009. They gave 15-30 minute presentations at Google's Mountain View campus this past October. In addition to these five, twelve more students from Johnny Martin's Spring 2009 class were invited to give lightning talk presentations and/or participate in poster sessions.

These students did work far beyond the course requirements, which included a final term project paper. According to the instructor, **Johnny Martin**, "...we were fortunate to have a conference deadline that coincided with finals week and offered students an opportunity to push a little harder to rework their classroom efforts into a more professional form suitable for conference submission.

If you meet any of Johnny Martin's CS 274 students, whether their full paper was accepted or not, please tell them "Congratulations, job well done!"

— Ken Louden

STUDENT TEAMS EXCEL AT ACM PROGRAMMING CONTEST

Two teams of students from SJSU competed with 75 other teams at the the 2009 Pacific Northwest Regional Contest of the ACM-ICPC programming contest on Saturday November 7, 2009. The Spartan Blue team placed 14th in a very strong field, just behind Stanford and Berkeley among Northern California schools and ahead of all other CSU teams.

A second team, Spartan Gold, placed a very respectable 43rd. The Association for Computing Machinery's Intercollegiate Programming Contest has been called the Battle of the Brains, and, at the top levels, brings collegiate programmers from 6 continents for an international competition. Members of the SJSU teams can be seen in the photo (left), from left to right: **Colin Blower** (Gold), **Alex Kerr** (Gold), **Kristopher Windsor** (Blue), **Vlad Dimitriu** (Blue), **Victor Frandsen** (Gold), **David Alves** (Blue).
Congratulations and thanks to our great teams!

SAN JOSÉ STATE UNIVERSITY College of Science

mathematics
the language of science, engineering and technology

VOLUME 13,ISSUE 3 FALL 2009 WWW.SJSU.EDU/MATH

Visit from only Congressman with a Ph.D in Mathematics

Congressman Jerry McNerney (Photo courtesy of Jerry McNerney's office.)

U.S. Rep. **Jerry McNerney** visited students of the mathematics department on Wednesday, April 8, 2009 as part of SJSU's sustainability week.

McNerney, D-Pleasanton, gave a speech to the math colloquium called "From Math to Renewable Energy to Congress," speaking about issues ranging from renewable energy sources to the "No Child Left Behind" policy. McNerney holds the distinction as the only member of Congress with a doctorate in mathematics.

"It was a real honor having him on campus, sharing his experience as a math major and as a Ph.D. in Congress," said Raudel Rivas, a senior mathematics major. "It was a good, enlightening experience to see what he had to say about the future of technology and the path that this nation is going to."

McNerney opened the speech with a brief history of his background, including his transition from mathematics to wind energy, and then opened it up for a Q-and-A session.

"The oil crisis of the 1970s made me painfully aware of how perilous our economy was depending on foreign oil," McNerney said of how he entered the world of renewable energy. "And some of the challenges were pretty exciting, the challenges of designing windmills, and making them last for a long time. I got an opportunity to work for them as a programmer and I took it."

Timothy Hsu, an associate professor of mathematics, said students and faculty were lucky to have McNerney as a guest speaker. "I've been following this sort of thing, the travails of our one math Ph.D. in Congress, for quite some time," Hsu said. "The one thing that I found out that really helped us is that Representative McNerney loves talking about math."

McNerney said he began his political career after being pressured from his son Michael, who joined the Air Force shortly after the Sept. 11 attacks. McNerney registered as a write-in candidate for California's 11th congressional district and won his party's nomination in 2004 by one vote following a recount. "That's the sort of lesson I teach high school students," McNerney said. "Your vote counts. Get out there and do your voting when you're 18, because every single vote counts."

Hsu said part of McNerney's visit was intended to emphasize to the math students that there are job opportunities for them in many fields. "This year in the math department, one thing that we're trying to do is we've been trying to put across to students that there are a lot of things that, if you get a math degree, that you can do besides just teaching math," Hsu said.

Some of the math department's recent graduates have found work in the fields of aircraft engineering and the financial industry, Hsu said. Michael Brunell, a senior mechanical engineering major, said this was the perfect lecture to attend. "To listen to him cover how mathematics impacted his life and how renewables are going to be a big thing was something that I was definitely interested in." he said.

—Brett Gifford, The Spartan Daily 4/13/09

Faculty News

JOANNE BECKER

In June I attended a week of the Park City Mathematics Institute hosted by the Institute for Advanced Study (Princeton). Park City is a three-week institute for high school math teachers, graduate students in mathematics, and mathematicians and mathematics educators. Dr. Richard Pfiefer and I co-sponsor a professional development outreach program for local teachers who have participated in past Park City Institutes; this group meets four times a year in Palo Alto.

MORE INFO

In May/June I also directed the Santa Clara Valley Mathematics Project, a 2-week institute for mathematics coaches and teacher leaders in grades K-8. This year we focused on taxi cab geometry for our content.

In July I led two year-three Algebraic Thinking professional development institutes, one for Pajaro Valley Unified School District, and the other for Ravenswood and Belmont/Redwood Shores School Districts.These projects are funded by the CA Mathematics Science Partnership Program.

A Coaching Institute was held for over 150 K-8 teachers in August, funded by the Silicon Valley Community Foundation and district support. We also presented a Coaching Institute in Oregon under contract with the Oregon Department of Education.

In July I presented a paper entitled "Justification schemes of middle school students in the context of generalization of linear patterns," co-authored with **Dr. Ferdie Rivera**, at the annual conference of the International Group for the Psychology of Mathematics Education in Thessaloniki, Greece.

Finally, we have received a subcontract to a grant to UC-Berkeley from the Gates Foundation to develop, test and evaluate performance assessments at the high school level in mathematics. This project, projected to last four years, is intially funded for over $1m for two years.

—Joanne Rossi Becker

meteorology

way better than groundhogs

VOLUME 13,ISSUE 3 FALL 2009 WWW.MET.SJSU.EDU

News

January 2010 Annual AMS Meeting to be held in Atlanta, Georgia

Spring 2010 Meteorology Alumni Dinner will be announced soon!

NEW FIELD TRIP

The Meteorology Department has secured funding to develop and conduct a new Field Studies course over the next three summers, and the inaugural Field Trip was run in August. The central goal is to expose our students to a wider range of weather phenomena other than what they see in the Bay Area. In particular, the course is designed to study so-called convective weather associated with the southwest monsoon. This includes thunderstorms and all the exciting things that come with them: heavy rain, hail, strong winds, lightning and thunder. On the field trip, we traveled to Flagstaff, Arizona, which served as our base of operations. Each night, including on the outbound and return trips, students and faculty gathered to discuss the forecast for active weather for the next day, and plan activities accordingly. We took with us a variety of instrumentation purchased for the field trip, including a new portable sodar, which is used to measure winds in the lowest part of the atmosphere.

The inaugural field trip was a great success, enjoyed by all who went, including undergraduate and graduate students for credit, **Professors Clements and Voss** who served as instrumentation and forecasting instructors, and Professor Bridger who served as class mom! The only thing that went wrong was that this was one of the driest monsoons in over 20 years!
View the class blog **HERE.**

We did encounter some convective weather, but in a normal year we would expect it almost every year. Instead, we were treated to several cloud-free days. Nonetheless we used the location to our advantage, and came away with lots of experience at setting out instruments, gathering and analyzing data, and of course forecasting. We're already looking forward to next year's trip!

EVENTS

The Meteorology Department was well represented at the recent 8th Symposium on Fire and Forest Meteorology is Kalispell, Montana. A session on fire weather field studies was dominated by **Professor Clements** and his students. Graduate student **Daisuke Seto** was given the "Best Young Scientist Award" for his presentation on "Fire Whirl Formation During a Valley Wind Reversal". **Professor Bob Bornstein** was given the Luke Howard Award for Outstanding Contributions to the Field of Urban Climatology by the International Association for Urban Climate.

Finally, we held two Alumni reunion events in 2009. In January, there was the American Meteorological Society (AMS) Annual Meeting in Phoenix and a spring dinner held on campus bringing together current students and alumni. This year, there will be a lunch at the upcoming AMS Annual Meeting in Atlanta in January, and an alumni dinner in the spring. Watch for this Alumni event announcement. Three of our faculty are retiring this year (**Professors Goodman, Bornstein and Steffens**), and we will be celebrating their work at the dinner.

—Dr. Alison Bridger

SAN JOSÉ STATE UNIVERSITY College of Science

moss landing marine laboratories explore the depths

VOLUME 13,ISSUE 3 FALL 2009 WWW.MLML.CALSTATE.EDU

Research Labs

CONSERVATION GENETICS LABORATORY

The SJSU Conservation Genetics Laboratory has a diverse population of graduate Masters students and undergraduates. We are focused on measuring biodiversity in terrestrial and marine systems (birds, mammals and invertebrates) using genetic data. Our studies include delineating the stock structure of Dungeness crab. The crab is a major fishery. Local abundance is sensitive to dispersal regimes of the planktonic larvae. We analyze genetic relationships of larvae and adults, deducing regional sources using genes.

Professor **Leslee Parr's** work also includes investigation of genetic differentiation, and possible sub-species level variation, in Dugong populations throughout the IndoPacific.

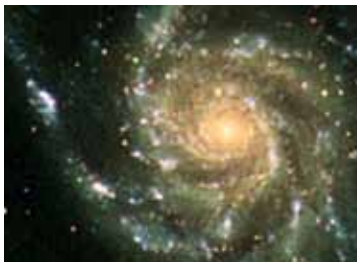
Joshua Mackie is an adjunct researcher and lecturer. In summer 2009, we have commenced studying the genetic relationships of a highly invasive marine organism – the bryozoan *Watersipora subtorquata* – which is moving onto coastlines around the world as result of transfer of colonies attached to ship hulls. Our aims are to determine whether the genetic variation (assessed via variable microsatellite 'finger prints' and mitochondrial DNA) of Watersipora populations, indicates that populations are first adapting to local temperature regimes in spreading widely, i.e. whether natural selection has a staggered influence on invasions. Physiological research is being conducted by Professor **Sean Craig** at Humboldt State University. Professor **Antje Lauer** at California State University, Bakersfield is working with her students characterizing the bacterial communities of these invasive species.

An important first step in this collaborative project was the award of funding through the CSU internal COAST (Council on Ocean Affairs, Science and Technology) program (Lauer, Craig, Mackie - *Evolution and Invasion: speciation, ecological differentiation and microbial symbiosis in the exotic bryozoans Bugula neritina and Watersipora subtorquata in California),* which provides teaching-release time to apply for operational grants. For information on the COAST (Council on Ocean Affairs, Science and Technology) linking researchers among California State University campuses, click the COAST link below.

COAST

—Joshua Mackie

SAN JOSÉ STATE UNIVERSITY College of Science



physics and astronomy

VOLUME 13,ISSUE 3 FALL 2009 WWW.PHYSICS.SJSU.EDU

Faculty News

In late May, **Peter Beyersdorf** gave an invited talk on novel optics at the 58th annual Fujihara seminar in Hayama Japan. The conference brought together scientists from a number of fields to promote a multi- disciplinary approach to addressing the challenges associated with gravitational wave detection.

Natalie Batalha and **Michael Kaufman** participated in the International Astronomical Union (IAU) General Assembly, held in Rio de Janeiro in August 2009.

The IAU is the premier international organization for research in astronomy and astrophysics, with more than 10,000 members from 90 countries. Batalha, a member of the Kepler science team, gave an invited talk on the choice of target stars for this planet hunting mission. Kaufman was co-organizer of a three-day special session at the meeting entitled "FIR 2009: the Interstellar Medium of Galaxies in the Far-Infrared and Submillimeter."

Alejandro Garcia co-organized, with **Dr. Michael Gallis** of Sandia National Laboratories, a four-day workshop entitled "Direct Simulation Monte Carlo: Theory, Methods and Applications" held in Santa Fe, New Mexico, September 13-16, 2009. This was the fourth biennial DSMC workshop organized by Prof. Garcia, the first being held in Milan, Italy in 2003. These international meetings have provided unique opportunities for over 60 participants to access the current state and future direction of the DSMC method, which is widely used for the computation of aerospace flows, micro-scale flows, nano-scale flows, plasmas, gas-phase reactions, phonon transport, dense gases, granular flow, agent modeling, traffic, and planetary atmospheres. Professor Garcia also taught a pre-workshop short course on DSMC and led the round-table discussion at the end of the meeting.

Lui Lam co-chaired the Second International Conference on Science Matters, titled Arts and Science: Humanities as Science Matters, Oct. 5-7, 2009, Estoril, Portugal. The participants consisted of professional artists, humanists and scientists, coming from Europe, China and USA. Science Matters is the new discipline originated by Lam; it treats all human-dependent matters as part of science.

Research

PRE-EARTHQUAKE SIGNALS

Dr. **Friedemann Freund** and Dr. **Robert Dahlgren** (Physics and Astronomy Adjunct Professor and Research Associate respectively) are pursuing their work on pre-earthquake signals and related subjects.

From the solid state physics perspective it's all about valence fluctuations in the oxygen anion sublattice of minerals in rocks. These valence fluctuations had been totally overlooked in the past, and lead to the generation of highly mobile electron vacancy defects, known in semiconductor parlance as "holes." These positive electronic charge carriers are activated and become mobile when rocks are either stressed or heated, and are manifested by changes in a number of material properties.

Over the summer 2009, in collaboration with REU student **Colin Williams** from the Kansas State University and Professor **George Tsoflias** from the University of Kansas, Freund and Dahlgren conducted an experiment at the NASA Ames Research Center, which can solve the longstanding riddle why highlands of Venus have a higher radar reflectivity compared to the lower elevations. In the experiment, a rock analog to what is found on Venus is heated at one end and monitored with a 1.2 GHz radar at the cool end. Heating to Venus lowland temperatures (above 450°C), the positive hole charge carriers flow rapidly to the cold end where they distribute into a surface layer. The appearance of this surface charge layer modifies the reflection coefficient which causes the radar beam to be more strongly reflected.

—Michael Kaufman

News

Physics Professor **Ramen Bahuguna**, Director of the Institute for Modern Optics, presented an invited talk, "Different Optical Techniques for sensing of Fingerprints" at ICOP-2009 (International Conference in Optics) held in Chandigarh, India last October. He also chaired a session on "Sensors."

The joint educational collaboration between the College of Engineering and Institute for Modern optics is continuing via the Graduate and Extended Studies office (GES) of the College of Engineering. The Institute faculty teaches optics courses at the Lockheed Martin and KLA Tencor which not only brings in funds but could lead to collaborative research in the future.

The **American Mathematical Society's 2011 von Neumann Symposium** will be "Multimodel and Multialgorithm Approaches to Multiscale Problems," organized by John Bell (Lawrence Berkeley National Laboratory), Chair, and **Alejandro Garcia** (San José State University). Multiscale problems are of increasing importance in the fields of physics, biology, chemistry, fluid dynamics, environmental science, materials science, geophysics, and all branches of engineering. The symposium will bring groups together in four key areas (fluids, solids, earth sciences, and molecular dynamics), and will enable applied mathematicians and scientists to discuss current practices and future research directions in the development of hybrid methodologies for multiscale phenomena. The AMS von Neumann Symposia are made possible by the generous support of a fund established by Dr. and Mrs. Carrol V. Newsom in honor of the memory of John von Neumann.

College of Science Alumni News

MATHEMATICS ALUMNI

Many thanks to those who responded to our Math Department alumni survey. Here are some of their stories.

Dolores Lucille Hintze graduated from San José State in 1942 with a BA Math and a minor in History/Political Science. Sister Lucille Hintze attended San José State and Stanford. She has teaching credentials from kindergarten through university. She received a STD at San Francisco Theological in 1977. After teaching in the California public schools, Sister Lucille joined the Sisters of the Holy Family. As a Sister she worked mainly in religious education for public school children. At present she is engaged in a ministry of writing and phoning to elderly and infirm. She taught herself to use the computer and finds e-mail a delight to use. She sends out about 1,000 letters a year; not counting e-mail and phone calls. Her career goal was to teach and she did. Her favorite professors were Dr. Hazlett and Dr. Myers. She says "Not only were they excellent teachers, but they encouraged me to stay in Math. The others tried to eliminate women as fast as they could. In 1940 or 1941, there was an honorary math fraternity, Gamma Pi Epsilon. I believe that I was the first woman member at San José State."

Marjorie Hopper Stuhlman received a B.A. in Math and General Secondary Education from San José State in 1946 with a minor in Physical Science. Marjorie writes that she attended SJSU from 1942-47 and was a member of the first class of graduate students. Her career goal was to teach and she taught for two quarters at SJSU, three years at Fremont High School in Sunnyvale (1947-1950), and from 1957-1982 she taught in the Modesto City Schools. Marjorie was department chairman at Modesto High School from 1960-82. Her favorite professors were Dr. Myers and Dr. Rhodes. She says "Along with my 30 plus years teaching I had 3 children (1 boy and 2 girls). My mother was a teacher and I have 1 daughter teaching as well as two granddaughters."

Claire Eugene Christensen received a BA Math from San José State in 1949. He was also one of the first students to receive a Masters in Math from our department, in 1951. He also received a teaching credential from San José State. He taught math and science at Templeton High School from 1951-54, Mountain View High School in 1954, and Los Altos High School from 1955-1979. He was the mathematics department chair at Los Altos High School. He also worked as a bookkeeper from 1984-1989. His favorite math teacher was Dr. Howard Myers who was then the Math Department chair. He says "Dr. Myers really got me interested in math. He was an exceptional teacher and gave you extra help if you needed it. I also liked Richard Cabot Dieckmann who helped me with my MA thesis."

Henry Rogalsky received a BA Math degree from San José State in 1953 with a minor in Physical Science. He also earned a general secondary teaching credential in 1954 and a high school administrative credential in 1974. He was a secondary mathematics teacher for 20 years and an assistant principal for 12 years in the Los Gatos-Saratoga High School District. He states "I taught all levels of High School Math – worked in High School administration in the areas of school facilities, athletic programs, computer systems, school security, discipline, and student activities. Among his favorite professors were Dr. Dieckmann and Dr. Smart. Important things he learned at San José State included math skills and math education, science education, and administrative classes that led

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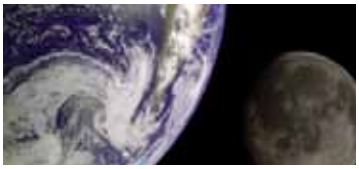


College of Science Alumni News

Continued from page 14

to an administrative credential. He has also served on various boards and committees relating to his church, and he was also chairman of the board of directors of the Lincoln Glen Retirement and Nursing Facility.

Glen Hage graduated from San José State in 1953 receiving a BA Math degree with a minor in physical science and a secondary teaching credential. He worked for almost 35 years at Lawrence Livermore National Laboratory (originally UCRL) working as a computer programmer on weapons research and other multidisciplinary research.

He states "I received a teaching credential in August 1954 and was a substitute teacher in San Mateo county until I received a letter from Frank Myers, head of the Math department noting openings at UCRL in Livermore and I stayed there for 34 years 11 months. I didn't plan to be a computer programmer because programmers didn't exist (actually they did – I just didn't know). I'll always remember Dr. Myers' letter and how he knew I was unemployed. Ironically I took no course in numerical analysis. That was my on-the-job training. A project lasting about a year made good use of infinite series by Professor Byrd. My success was having a good steady job for 35 years. Knowing that I would have a teacher's salary led to my frugality that led to my good investments that led to success. I remember carpooling to San José State for evening classes with four others and how we were almost killed on a back road from Livermore. That took the fun out of it. Several of my co-workers were ex-teachers. Those were the days before computer science existed."

James Wilson received a BA Mathematics degree from San José State in 1962. He was a systems engineer for IBM (now retired). A class in Programming IBM 650 that he took and the computing skills he learned at San José State proved very helpful in his career. His favorite professor at San José State was Dr. Myers.

Al Santos received a BA Mathematics degree from SJSU in 1968 and a Masters in Education from San José State in 1969. He taught for 34 years as a high school math teacher in the San José Unified School District, teaching subjects ranging from general math to AP Calculus. He retired in 2002. He was also a boys and girls tennis coach for 25 years. Al was the ALHS Teacher of the Year and SJAL Tennis Coach of the Year in 1995.

He states that teaching high school math was a very fulfilling career that produced many close friends. His favorite professor at San José State was Dr. Marks "who inspired me to do math with enthusiasm and humor. In 1969 the education program at San José State seemed to have little relevance to teaching students. Actual class time with students was the best instructional tool along with advice from a "good" resident teacher. Obviously, my math major program at San José State was crucial for my career. My student teaching was very valuable to my career. My teaching tennis at SJ Swim and Racket and Courtside Club helped with my career as a tennis coach. If you want a rich career where you do make a difference and change lives positively, try teaching. If you want to get rich in other ways, try something less honorable."

—Submitted by Dr. Brad Jackson

Institutes and Programs

MESA SCHOOLS PROGRAM

The Mathematics Engineering Science Achievement (MESA) Program was founded in 1970 in California with the goal to enable educationally disadvantaged students to prepare for and graduate from a four-year college or university with a math-based degree in engineering, the sciences, computer science, business or mathematics. Through MESA, students develop academic and leadership skills, increase educational performance, and gain confidence in their ability to compete professionally.

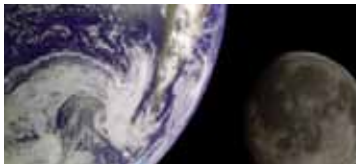
The need to develop the talents of educationally disadvantaged students, who constitute over 40% of public school students in Santa Clara County and 30% of students in the San Mateo County, is urgent. This is particularly important since an increasing number of jobs are information-based, and require technical training. Students who are defined as educationally disadvantaged, particularly if they are from groups defined as having low-eligibility for higher education, such as African American and Latino students, are not entering and graduating from college in representative numbers, much less pursuing math-based bachelor's and advanced degrees. Silicon Valley, the most highly-developed research and development collaboration of technical companies and major universities in the world, is located in Santa Clara County in close proximity to the schools the MESA Schools Program at San José State University serves. Yet student performance continues to suffer, particularly in the schools having the highest enrollment of students who are educationally disadvantaged.

Today, as MESA arrives at its 40th anniversary, it is still the only program that focuses on underrepresented students in higher education in science, technology, engineering and math. MESA intervenes in the lives of average, often uncommitted students who are under-represented in university math-based fields and gives them a higher standard of academic excellence. MESA Schools Program (MSP) at the San José State University (SJSU) Center assists pre-college students starting at the middle school level through high school. The program provides academic and enrichment services to over 1,000 students annually within twenty schools in Santa Clara and San Mateo Counties.

The MESA Schools Program at San José State University has been successful at reaching out to those students who have the aptitude to excel in math and science and go on to pursue college level degrees. Over 81% of MESA high school seniors go on to college and 41% of MESA's African American, Latino America and American Indian high school seniors are University of California eligible and go on to pursue degrees in math and science compared to 6% of the State of California's average.

Most of MESA's students may not appear to be among the traditional "best and the brightest." However, with creativity, innovation and committed staff, partners and industry, MESA remains a strong program helping educationally disadvantaged students in our community succeed.

—Christina Ramos



Institutes and Programs

PROFESSIONAL SCIENCE MASTERS (PSM) OF BIOTECHNOLOGY

MBT Students Win Neat Ideas Fair

A team of students from the Department of Biological Science's Master of Biotechnology (MBT) Program took first place out of over 150 entrants for their presentation of their business idea in the Neat Ideas Fair, sponsored by the College of Business Silicon Valley Entrepreneurial Society. Two other MBT teams tied for honorable mention (4th place). The first place team members consisted of **Brandon Espinosa, Divya Amarnath, Pranati Dalvi, Suhas Gandhi**, and **Minju Kalithil** and proposed a process for recycling plastic. Brandon Espinosa also won second place out of over 50 entrants for his elevator pitch of the team's business idea.

The two other teams consisting of **Erica Anderson, Prachi Gujar, Cristine Quiason, Malini Vangipuram**; and **Sylvia Do** proposed developing a unique electronic laboratory notebook and a mechanism for individuals to test their food for common allergens like nuts and wheat.

The Professional Science Master of Biotechnology Program (mbt@science.sjsu.edu) is a unique master's program that integrates advanced science and management skills to prepare graduates for the biotechnology industry.

MORE ON MBT

— Sally Veregge, Ph.D.

The Scientist

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