

Bios

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For back issues and more information about the Department: www.csun.edu/biology

New Microbiologist, David Bermudes

This fall, Dr. David Bermudes joined the faculty of the Biology Department. He is teaching Medical Microbiology (BIOL 410/410L) in both the fall and spring semesters. Bermudes grew up on Martha's Vineyard.

As an undergraduate at Oberlin College in Ohio, Bermudes' research career began with a study on orchids and bromeliads in Ecuador. "I was struck at the time by how strongly microbial interactions could influence plant biology." Bermudes found that orchid root association with filamentous fungi tended to be inversely proportional to their amount of foliage, with shootless orchids having up to 90% of the length of their roots colonized by fungi. He also found the microbiota of bromeliad tanks to be equally impressive. Later he returned to Ecuador and measured nitrogen fixation in bromeliad tanks. "That was really my first experience with symbiosis."

The Ecuador experience led Bermudes to graduate research on the endosymbiotic theory with Dr. Lynn Margulis at Boston University. There he worked on spirochetes and did studies showing that they contain proteins immunologically related to eukaryotic tubulins. "Perhaps it's a coincidence," he remarked, "but I am the third CSUN medical microbiologist to have done spirochete research, an area in which my predecessors Daisy Kuhn and Nancy Bishop both specialized."

Following his Ph.D., Bermudes moved to the University of Wisconsin Center for Great Lakes Studies in Milwaukee. He worked on the bioluminescent bacteria *Photorhabdus*,



which is symbiotic within nematodes that are pathogenic towards insects.

Bermudes next moved to the Infectious Diseases Section of Yale Medical School, where he studied *Toxoplasma gondii*. He was the first person to clone a functional enzyme expressed within the parasitophorous vacuole in which the parasite resides during infection. With colleagues at Yale in Dermatology and Therapeutic Radiology, he also pioneered the first use of *Salmonella* as a live cancer therapeutic agent.

Bermudes' next job was with Vion Pharmaceuticals where he helped bring the *Salmonella* cancer therapeutic project to human clinical trials. During that period, he also maintained a position as an Adjunct Assistant Professor of Clinical Medicine at Yale and lectured there in genetics. He later moved to Vancouver, where he oversaw preclinical evaluation of novel nanoparticle and liposomal cancer therapeutic agents at Celator Pharmaceuticals.

Bermudes' current research is on *Salmonella* and their use as tumor-targeting vectors. "*Salmonella* has enormous potential for treating cancer because of its ability to find and selectively replicate within tumors" says Bermudes. Although the first clinical trials did not show any evidence of antitumor effects, they did show that *Salmonella* could be engineered to be safe enough to administer to humans and that the bacteria successfully colonize tumors in some patients. "That wasn't bad for a first try" he says, "but we need better bugs with the ability to both target tumors and have a significant antitumor effect."

Students in the Bermudes lab will have the opportunity to use molecular microbiology techniques and synthetic

biology to study compensatory suppressor mutations in *Salmonella* that have the potential to improve their antitumor qualities. Bermudes welcomes inquiries from prospective students via david.bermudes@csun.edu

Summer trip for winter break

—Denita Weeks

We are on a windy mountain road. To one side is a crisp landscape of lakes feeding lakes. To the other side are snow-capped majestic mountains that disappear into the clouds. A picture of it cannot even compare to the real thing.

We are driving back to the middle of Argentina on a 3000-mile circuit to Patagonia and back. I am with my master's thesis advisor Dr. Robert Espinoza. We are on a summer fieldtrip during winter break.

My research is to map the thermal niche of the world's southernmost gecko, Darwin's marked gecko (*Homonota darwini*). We will combine this information with global climate change scenarios to predict the future geographic range of the gecko.

We started our trip in Salta Province. Dr. Espinoza introduced me to some of his friends and colleagues at the Universidad Nacional de Salta. They fed us and showed me around while we gathered our supplies, tracked down permits, and worked out renting a truck.

When we left Salta to start our journey, many of Dr. Espinoza's friends and colleagues provided us with a place to stay, great food, and yerba maté to get us through our long hours of running experiments. Eduardo Sanabria and Lorena Quiroga, Ph.D. students in Argentina, helped us collect lizards at their field site in San Juan Province and let us use their home as a lab for days as we designed and ran our experimental trials.

We were gathering data on sprint performance and thermal tolerances of *H. darwini* for multiple populations throughout its range. We used a temperature-adjustable racetrack that we brought in our luggage to test performance. However, the limit to luggage space meant I would be setting up the thermal tolerance experiments with supplies we could find at the local store. It

was a challenging task, and I fussed as lizards slipped out of plastic jackets, water leaked out all over the floor when a hose sprung loose, and I electrocuted myself (not badly) because I misused the water heater. But, when the experiments finally worked, it was rewarding. Even with pressing time and limited supplies, it all came together.

At my first field site, I felt like a little kid. It was the first time I would meet the world's southernmost gecko. The site was surrounding an abandoned shack overlooking a vast valley. The wind blew so hard we had to hold onto our hats. We captured a healthy sample size and with the satisfaction of a successful collecting day, we headed south toward Bariloche, Río Negro.

In beautiful Bariloche, where the town sits on a lake that mirrors the reflection of the Andes, Drs. Félix Cruz and Gaby Perotti, husband and wife, welcomed us into their home. When they came out in the field to help us collect, Gaby found more lizards than the rest of us combined! They let us use their lab until the wee hours of the morning to run experiments, and were kind enough to let me put geckos in their kitchen freezer to cool down the animals.

After we left Bariloche, we were on our own for quite some time. Patagonia really is a different world. Heading east, the mountains disappear, yielding to miles and miles of flat steppe. Borders are no longer patrolled by police, and a traveler should always fill up at every a gas station because it's hard to tell when the next one will come.

In the little town of Tecka, we pulled in for gas to find a line of cars. The truck drivers for the gas company were on strike. For two days we stayed at a "hotel" in the back of the gas station, running experiments and waiting for the gas truck to come. When it finally arrived, we fueled up and drove throughout the night to make it to Puerto Deseado, our southernmost field site where Charles Darwin had collected the type specimen of my study species.

The overnight drive left us very tired and, consequently, forgetting to turn off the headlights during a two-hour nap on the side of the road, which left us with a dead battery. One of us pushed while the other tried incessantly to start the truck.

Lucky for us, a local came and helped us. We were on our way. That same day, we made it to our field site, and the battery died again. This time we weren't near a village. With little water and no shade, we were fortunate that a passer-by called a tow truck before we had to walk to town. We could never predict what would happen next, but we were very lucky that our vehicle troubles were always minor.

In between all the traveling and late nights of running experiments, there were moments when I had a chance to stop and take in the beauty of Argentina. During one of those times, Dr. Espinoza and I had been driving for hours in Patagonia and we were far from any town lights. We stopped the truck and could see the Milky Way. I had never seen such a beautiful night sky.

On our last night collecting, we didn't find the field site until dusk. As the last of the sun's rays disappeared over the horizon and we found our last gecko, we sat down to rest. For once, the wind in Patagonia wasn't howling in our ears and we could appreciate the pristine silence of the desert at night before heading north again.

My work isn't finished yet. I have one more field season in Argentina where Dr. Espinoza and I will gather metabolic data for *H. darwinii*. From our first field season, we found that the lower thermal tolerance for some populations reaches sub-freezing temperatures. This has never been reported before in a gecko!🐸

On a Caribbean island

—Cindy Ross¹

What can be better than spending four weeks of summer on a tropical island? —Doing it twice and not paying for it. That's exactly what I've done!

I've just returned from my second coral reef research trip to St. John in the U.S. Virgin Islands with Dr. Peter Edmunds' lab. This summer's trip was with Dr. Edmunds and two grad students, Darren Brown and Lianne Jacobson. We spent four weeks living in a sweaty cabin in the mangrove swamp and diving 2-3

times a day to count corals and algae. The work is part of a long-term monitoring program in the Caribbean.

One particular coral, *Montastraea annularis*, was the focus of much of our effort. This important reef-building coral has been declining in abundance since at least the mid-1980s. There seem to be multiple reasons why it has died off, including storms and bleaching, but these effects are compounded by low recruitment. The adult colonies, which can be ancient, have been dying off, and there appear to be few babies replacing them.

The loss of *Montastraea* is particularly important, as this species plays a key role in Caribbean reefs. Its disappearance is changing the structure of the coral reefs, which are critical communities on a worldwide basis.

My role in 2009 was to conduct surveys over large areas of coast for juvenile colonies of *Montastraea*. This year, I was able to witness again how quickly the reef environment can change and to conduct my own research exploring larval connectivity between coral reefs in the Great Lameshur Bay area.

For the past four years, recruitment rates around the Bay have been monitored by examining the corals that have settled on fixed tiles at several sites. Each year these tiles are removed and the corals are counted and identified. To examine connectivity between the reefs, I wanted to compare what we found on the tiles to the populations of naturally occurring corals at these sites with the assumption that the arrival of babies should relate, at some level, to the size structure found at a site.

Surveys were conducted at each tile site measuring corals within the four taxonomic families that have shown the highest recruitment levels. The analysis is not complete. It will be interesting to see if these coral communities are self-seeding. Are they producing babies that settle on the same reef, or are the larvae being transported in from elsewhere? This information will be useful in determining the boundaries of marine protected areas and can assist in the development of policies that may influence the health and replenishment of the reefs.

¹ Ross' research was funded by a Research Experience for Undergraduates supplement to a National Science Foundation grant: www.nsf.gov/crssprgm/reu

Without seeing the reefs myself, I never would have understood just how fragile they are or how much they are changing. My involvement in research started by taking Invertebrate Zoology in 2008, and then telling my professor that I wanted more. I am now looking forward to graduation as the co-author of a published paper (see New Publications) and a couple of years of experience in a research lab. The opportunities are out there. Sometimes you just have to ask. ♣

Science made personal

—Alex Metea

For an undergraduate biology student dreaming of field research, year after year of lecture courses really starts to be a drag. I acknowledge the obvious benefits provided by a broad foundation, but the opportunities to be “real” scientists – to explore, to discover, to *know* firsthand – seem distant when you still have to take four chemistry courses.

I came to learn that CSUN has an option available for biology students with a sense of adventure: the Tropical Biology Semester in Ecuador. From cloud forests crowning the Andes, to the heart of the Amazon rainforest, to the Galápagos Islands, the Tropical Biology Semester was by far the most amazing part of my education (so far).

Professors Fritz Hertel and Tim Karels supervised and guided twelve of us as we climbed mountains and stumbled around the forests in Ecuador from February 15th to April 5th, learning firsthand that field science isn't like a *National Geographic* special. There was certainly plenty of adventure – zip-lining across mountains, exploring the rainforest canopy via a system of treetop towers, floating down piranha- and candiru-infested rivers, getting stung by bullet ants, snorkeling alongside marine iguanas and sea turtles – but it was first and foremost a learning experience. I now understand and appreciate exactly how much work goes into being a “real” scientist.

We were graded on the design and execution of two individual studies, participation in two class projects, and a weekly discussion of scientific studies relevant to the Neotropics. I worked on the wing morphology of bats relative to

trophic guild, and on the herbivory experienced by understory ferns. The former was by far more fun to conduct. The high point was deploying mist nets with Boston University students at what locals call a *saladero*, or salt lick. We caught more bats than eight people could process! The fern project involved a lot of tedious counting, but my results raised some interesting questions that remain mostly unanswered even after consulting all available publications. It turns out ferns haven't been as extensively studied as bats. Who would have guessed?

Of course, there were many unexpected lessons beyond exploring the scientific process. It is always instructive to be exposed, even briefly, to cultures different from our own, if only to consider our way of life and the price we pay for it. I'll spare you the details, but my experiences in Ecuador have made me more conscious of the consequences of my actions, as an individual and a citizen of the U.S. Thanks to this journey, I've decided to pursue science as a career, hoping to make *some* contribution to the betterment of our world.

There is no classroom substitute for this trip. Dr. Karels and Dr. Hertel provided invaluable guidance and insight, but refused to hold our hands (even when I begged, “Like *please*, dude.”). They had the audacity to challenge us on every level, leaving it to us to make the most of this adventure. I'd kill for a chance to return to Ecuador. If the 2012 class notices an extra heavy suitcase before leaving LAX, please unzip it a little so I can breathe. ♣

Coral larvae in acid oceans

—Aaron Dufault

Since starting my M.S. degree last year, I have worked in Moorea and in Taiwan. The research has focused on the effects of climate change on coral larvae and juvenile corals. Most recently, I tackled this work over two months at Taiwan's National Museum of Marine Biology and Aquarium (NMMBA).

When most people think of coral reefs, they see images of coral cays in the South Pacific or Caribbean and rarely consider Taiwan as a venue for spectacular reefs. But southern Taiwan is at the northern extreme of the Golden

Triangle. As such, it harbors impressive coral reef diversity. Also, the reefs near Taiwan are frequently impacted by cyclones, so disturbance is a factor. These reefs contain hundreds of coral species and countless fishes that provide dives rivaling the Great Barrier Reef.

At NMMBA the equipment available to researchers is unlike any other marine station I've visited. The main research building contains hundreds of aquaria capable of housing both large and small marine organisms. There are research aquaria the size of swimming pools!

My project focuses on the effects of ocean acidification on young corals. Ocean acidification is a process caused by the dissolution of atmospheric CO₂ in seawater, which causes a decline in pH and makes calcification progressively more difficult for many organisms with hard parts, including corals. However, there is no consensus on how these physical changes affect each coral life stage or whole coral reef communities.

My research in Taiwan focuses on how the growth of baby corals is affected when exposed to increased amounts of CO₂ in the seawater. Additionally, I am interested in how corals respond to oscillating acidification, as compared to static seawater conditions. Each day on a reef, the seawater chemistry fluctuates, which is primarily caused by the metabolic activities of the photosynthetic organisms living there. To date, we only know how corals respond to increased CO₂ in carefully controlled lab conditions. It is my aim to improve the ecological relevance of our future predictions for corals by more closely mimicking natural reef conditions.

Despite being busy with research, in the lab and the field, our team had time to experience the culture and foods of Taiwan.

The first trip to a local night market was a memorable experience. The markets are filled with street vendors selling products ranging from sweet pastries to cheap sunglasses. Walking the market, searching for food, we encountered a rather foul aroma. Our hosts explained, “It's stinky tofu.” Vivian Cumbo (a postdoc at CSUN working on this project), Sylvia Zamudio (a CSUN undergraduate) and I decided we had to try it, so now I can say I have!

Several other extraordinary experiences, from braving the streets of Taiwan on a motor scooter to meeting a sea snake up close and personal, have made our trips to Taiwan truly memorable. In a microcosm, these experiences summarize an important part of our work overseas, which entails new exchanges – both scientific and cultural – that make intense periods of travel and work overseas truly life-changing experiences.

I have now completed two trips to NMMBA and have become very fond of my colleagues in Taiwan. I look forward to building upon my early results to better understand how corals respond to ocean acidification in future field seasons in southern Taiwan. 🌊

Science Tutoring Center

Some grad students are in LO1327 to help you one-on-one. Learning is not done only through sitting in lectures and staring at the book. Go to your professors' office hours, and go to tutoring. Some tutor or other is capable of helping with any topic covered in any 100-level Biology, Chemistry, or Physics course, as well as Genetics, Cell, Evolution, Human Anatomy, Human Physiology, and statistics. Hours of particular specialists are posted on the door. It's paid for through your Campus Quality Fee. Please make good use of this learning resource. 🌊

Awards

At the university level **Diana Naderi** received the Outstanding Graduating Senior Award. At the department level, Naderi was also given the Outstanding Biology Student Award.

Other awards given by the Biology Department were as follows. **Joseph Benoun** received the Bennett-Bickford Award for promise as a teacher. **Jessica Beach** received the Outstanding Biology Graduate Student Award. **Carly Ryan** received the Outstanding Graduate Research Award. **Christopher Bowman-Prideaux** received the Outstanding Graduate Teaching Award. And **Jenieke Allen** received the Hugo and Irma Oppenheimer Award.

Sofia Radillo was named an AMGEN scholar. This is an award made

to students with exceptional promise in research.

Emeritus Professor **Tony Gaudin** was chosen as Best Professor at IV Tech College Columbia. Tony won a similar award at CSUN during his "first" career.

Emeritus Professor **Jim Dole** has won the library's Volunteer of the Year award. 🌊

At national meetings

The Oppenheimer lab gave more presentations at the Experimental Biology 2010 meetings than at any other scientific conferences in the history of the Oppenheimer operation. Presentors' names are given in bold:

- Grad student **Krystal Jarvis** presented, "Use of post-fertilization aggregates of sea urchin embryos from denuded eggs to study self-adhesive properties of the hyaline layer: glycosidases" on behalf of herself, B. Itoni, J. Dreyfuss, C. Coyle-Thompson, E. Carroll, and S. Oppenheimer.

- K-12 teacher **Greg Zem** presented, "Kinetics of yeast dissociation from lectin beads: I. alpha methyl mannose" coauthored by J. Dreyfuss, J. Allen, R. Kawashima, E. Daco, Y. Kanda, J. Yaghoobian, S. Danialian, W. Givens, A. Baghoomian, N. Zograbyan, S. Haroutounian, N. Bimanand, S. Silani, H. Khorrami, M. Hashemieh Shirazi, K. Keihani, G. Tafreshi, A. Jahanbakhsh, A. Solati, H. Balazadeh, H. Phan, L. Papazian, A. Moayer, and Oppenheimer.

- **Zem** continued with, "Kinetics of yeast dissociation from lectin beads: II. Alpha methyl glucose" coauthored by J. Dreyfuss, J. Allen, R. Kawashima, E. Daco, Y. Kanda, J. Yaghoobian, A. Cochran, J. Sobhani, K. Pouromid, S. Jahanian, A. Solati, H. Balazadeh, D. Hernandez, M. Cortes, K. Kermani, and Oppenheimer.

- **Zem** concluded with "Kinetics of yeast dissociation from lectin beads: III. potassium chloride" coauthored by J. Dreyfuss, J. Allen, R. Kawashima, E. Daco, Y. Kanda, T. Koleilat, M. Khurram, J. Yaghoobian, S. Dabalian, M. Marroquin, L. Wolfenden, and Oppenheimer.

The following five presentations have their roots in the class Full Immersion

Experience in Research taught by Dr. **Cathy Coyle-Thompson**.

- "A novel microdissection model for probing cellular interactions. I. alpha methyl mannose blocks the cellular interaction," by **Coyle-Thompson**, T. Askari, M. Mkrtchian, G. Portillo, M. Manukyan, S. Abramian, M. Qubrosi, E. Makhoul, R. Frederick, J. Allen, J. Dreyfuss, and Oppenheimer.
- "A novel microdissection model for probing cellular interactions. II. LCA and PSA binding sites identified" by **J. Allen**, **J. Dreyfuss**, Coyle-Thompson and Oppenheimer.
- "A novel microdissection model for probing cellular interactions. III. mapping with ConA and mannan beads," by **Coyle-Thompson**, O. Badali, T. Askari, M. Mkrtchian, G. Portillo, M. Manukyan, R. Frederick, S. So, and Oppenheimer.
- "A novel microdissection model for probing cellular interactions. IV. ConA bead binding parameters" by **Theavy So**, **Herry Budiyo**, Allen, Akari, Coyle-Thompson, and Oppenheimer.
- "A novel microdissection model for probing cellular interactions. V. free mannan," by **Coyle-Thompson**, S. Abramian, A. Akinlolu, J. Allen, T. Askari, J. Dreyfuss, R. Frederick, K. Jarvis, E. Makhoul, M. Manukyan, M. Mkrtchian, A. Nazaryan, P. Ollawa, G. Portillo, M. Qubrosi, L. Ramos, E. Vasquez, and Oppenheimer.

The Joint Meeting of Ichthyologists and Herpetologists was in Rhode Island this year. Dr. **Robert Espinoza** gave an invited talk, "The herpetofauna of South America's southern cone: new discoveries from the Andean peaks to the Patagonian steppe." **Denita Weeks** gave a talk, "Geckos on ice: unexpected thermal tolerances and temperature-dependent performance of the world's southernmost gecko." Weeks' talk won the Seibert Award in Physiology/Morphology from the Society for the Study of Amphibians and Reptiles. Navasha Singh gave a poster, "Green guts are great(er): dietary correlates of lizard digestive tract gross morphology." **Barbara Sanchez** presented a poster, "Impacts of pollutants on a valuable nearshore marine fishes." **Jennifer Granneman** presented a talk, "Fishes living on artificial reefs in southern California." Granneman gave a similar talk at the annual meeting of the

Southern California Academy of Sciences.

Two of Dr. **Gini Vandergon**'s grad students presented posters at the Society for the Study of Evolution meetings.

Christian Rodriguez' poster was, "Gene duplication of chalcone synthase in Hawaiian silverswords and California tarweeds." **Ekaterina Kovacheva**'s poster was, "Evolution of anthocyanidin synthase in Hawaiian silverswords and California tarweeds."

At the National Noyce scholars meeting in Washington, D.C., Vandergon along with three of the Noyce scholars, **Kyra Grywacz**, **Robin Sehler**, **Ashley Winkler**, presented a poster, "CSUN Noyce math and science scholars."

Dr. **Sean Murray** presented a poster at the Gordon Research Conference on Bacterial Cell Surfaces in New Hampshire in July 2010: "Use of bacteria for rapid, environmentally-benign, pH neutral hydrolysis of hydrophobic carboxylic acid esters useful in synthetic chemistry."

At the American Society for Microbiology, **Anabel Herrera** and **Yannet Perez** presented a poster on their research, "Overexpression of temporally-regulated cyclopropane fatty acid synthases cause growth defects in *Caulobacter crescentus*." Both students graduated this summer with bachelor's degrees. They worked on their projects in the Murray lab for five semesters. Both plan to become clinical laboratory scientists.

Chris Bowman-Prideaux gave a presentation at the annual meeting of the Ecological Society of America, "Searching for a needle in a haystack: Using GIS to identify likely locations of previously unknown populations of an endangered species" on behalf of himself, Dr. **Christy Brigham**, and Dr. **Paula Schiffman**.

Our renown

Dr. **Steve Oppenheimer** served on a grant review panel at NSF, gave the keynote address at the graduation ceremony for Magnolia Academy, and the inaugural address for the general education honors program here at CSUN.

Dr. **Robert Espinoza** spoke at La Sierra University, "Small, cold-climate lizards break the 'rules' of herbivory in

reptiles."

Beck Wehrle gave a talk at the Smithsonian Tropical Research Institute, in Panamá, "Iguanas and microbes." He spent the early part of the summer there doing research.

Dr. **Sean Murray** gave seminars at Seton Hall University and Montclair State University, "Suppressors of growth defects in tumor-targeting *Salmonella*." The research was done in collaboration with Dr. **David Bermudes** over many years.

Dr. **Paul Wilson** gave seminars at Duke U. and at Harvey Mudd College, "Shifts between bee- and bird-pollination."

Dr. **Maria Elena de Bellard**, who is spending the year in Indonesia studying sea jellies, has been invited by a number of elementary and high schools to talk about her Fulbright research, and about conservation of Indonesian biodiversity. At one of the poorer schools, the press came and took videos of the kids looking through microscopes and opening fertilized gecko eggs. de Bellard's picture was all over the papers the next week: our prof became a celebrity in Surabaya. Now more schools are inviting her to talk about science.

Drs. **Mark Steele** and **Clare Wormald** participated in a technical workshop with other experts to help design the monitoring plan for a new array of marine protected areas in southern California.

Steele has also been re-appointed for a second three-year term as our campus' representative to the CSU Council on Ocean Affairs.

Biological Ecology & Evolution Reading Club

BEER Club's new President will be graduate student **Nick Gutierrez**. Grads **Beck Wehrle** and **Mark Oliva** will serve as Vice President and Treasurer, respectively. Dr. **Paula Schiffman** is the Club's faculty advisor. The purpose of the BEER Club is to provide students and faculty a forum for discussing the literature and project ideas in the fields of behavior, ecology, and evolution. Through these interactions, we expand our knowledge and hone our critical thinking and reading skills. All students

and faculty with an interest in these areas are encouraged to attend. BEER Club meets Thursdays at 11:30 in CR5336. Drinks and snacks are available at the meetings for a small charge and proceeds go to sponsoring guest speakers, funding student travel, etc. For more, email pschiffman@csun.edu

New Publications

Dr. **Tim Karels** and coauthors have a paper in *Ethology*: "Mutual mate choice for colorful traits in king penguins."

Dr. **Peter Edmunds**, students, and collaborators from other institutions have six new papers. (1) Edmunds, undergrad **Cynthia Ross**, and high school teacher **Craig Didden** have a paper in *Coral Reefs*, "High but localized recruitment of *Montastraea annularis* complex in St. John, U. S. Virgin Islands." *Marine Ecology Progress Series* is publishing, (2) "Landscape-scale variation in coral recruitment in Moorea, French Polynesia" and (3) "Response of a branching coral to corallivory varies with environmental conditions" by Edmunds and collaborators. (4) Former grad student **Hollie Putnam**, Edmunds, and Taiwanese collaborator Tung-Yung Fan coauthored, "Effect of a fluctuating thermal regime on adult reef corals and their larvae" in *Invertebrate Biology*. (5) *Annual Review of Ecology, Evolution and Systematics* is publishing, "The effect of ocean acidification on polar, temperate and tropical marine calcifying organisms: an organism to ecosystem perspective." (6) "The population biology of *Porites astreoides* and *Diploria strigosa* on a shallow Caribbean reef," a solo authored paper by Edmunds, in *Marine Ecology Progress Series*.

John Ingrum, Dr. **Shawn Nordell** and Dr. **Jim Dole** have a paper in *Ethology, Ecology and Evolution*: "Effects of habitat complexity and group size on perceived predation risk in goldfish."

Yasuko Hirakawa, Dr. **Rheem Medh**, and Dr. **Stan Metzenberg** have a paper in *BMC Molecular Biology*: "Quantitative polymerase chain reaction analysis by deconvolution of internal standard."

Three publications of various sorts have emanated recently from the lab of

Dr. **Steve Oppenheimer**. (1) **Brian Itoni, Haike Ghazarian**, Dr. **Stan Metzenberg, Virginia Hutchins-Carroll**, Oppenheimer, and Dr. **Ed Carroll** have a data report in *Experimental Cell Research*, "Use of specific glycosidases to probe cellular interactions in the sea urchin embryo." (2) **Haike Ghazarian, Brian Itoni**, and Oppenheimer authored, "A glycobiology review: carbohydrates, lectins, and implications in cancer therapeutics" in *Acta Histochemica*. (3) Also in *Acta Histochemica* is an opinion paper, "Improving science education worldwide" by Oppenheimer.

Dr. **Robert Espinoza** and colleagues have two new papers: "A critical review and systematic discussion of recent classification proposals for liolaemid lizards" in *Zootaxa*; and "Taxonomic history of the iguanian lizard *Liolaemus pictus major* with a revalidation of *Liolaemus capillitas*" in *Journal of Herpetology*.

Janna Fierst's thesis has been turned into a paper, "Spatial distribution and reproductive phenology of sexual and asexual *Mastocarpus papillatus*," by Fierst, Dr. **Janet Kübler**, and Dr. **Steve Dudgeon** in *Phycologia*. In *Marine Ecology Progress Series*, the following paper was an invited contribution: "Phase shifts and stable states on coral reefs" by Dudgeon, R. Aronson, J. Bruno (M.S. '95), and W. Precht.

Dr. **Sean Murray** has a paper with colleagues in *Acta Histochemica*: "Temperature-induced activation of freshwater Cyanophage AS01 prophage."

Dr. **Aida Metzenberg** and colleagues have two new papers out: (1) "Novel mutations of the DKC1 gene in individuals affected with dyskeratosis congenita." appeared in *Blood, Cells, Molecules and Diseases*. (2) "Attitudes of genetic counselors towards genetic susceptibility testing in children" appeared in *Journal of Genetic Counseling*.

There are three new papers from the lab of Dr. **Mark Steele**: (1) R. R. Vance, M.A. Steele, and G.E. Forrester authored, "Using an individual-based model to quantify scale transition in demographic rate functions: deaths in a coral reef fish" in *Ecological Modelling*. (2) J. M. Heinlein, A.C. Stier, and M.A. Steele

authored, "Predators reduce abundance and species richness of coral reef fish recruits via non-selective predation" in *Coral Reefs*. (3) Several coauthors along with Dr. **Clare Wormald** authored, "Synthesizing mechanisms of density dependence in reef fishes: behavior, habitat configuration, and observation scale" in *Ecology*. ♣

Summer at research institutes

Many universities have summer programs. They often pay for transportation to and from their location, room and board, and a stipend.

Grad student sisters **Adorina Moshava** and **Arbella Moshava** were sponsored by the Science Teacher and Researcher (STAR) Program to do microbiological research at the Jet Propulsion Laboratory. **Arbella** spent her summer studying microbes that contaminate instruments used on Mars missions. Now that **Arbella** has identified some of the microorganisms contaminating equipment, other researchers at JPL will work to develop better disinfection protocols. It is critical for NASA instruments meant to collect samples from Mars to not include microbes or organic material from Earth. **Adorina** focused on the growth of the bacterium *Clostridium vincentii* at low temperatures that are comparable to those found on Mars. Her work is related to NASA's Planetary Protection Mission and life detection. **Arbella** and **Adorina** expect to complete both CSUN's M.S. program in Biology and the teaching credential program in 2011. Both hope to bring microbiology into high school classrooms. Both are studying under Dr. Murray.

MARC/MBRS students are given strong guidance to get out of here for the summer. Here's a list of those who did last summer: **Daniel Sivalingam** completed a summer research experience at U. New Mexico. **Christine Camarena** worked at UCLA on a neuroscience project. **Don Tran** worked at USC. **Silvina Kroetz** and **Sofia Radillo** both had summer positions at Cal Tech. **Kathy Espino Perez** was involved in the McNair program held at the Claremont Graduate U. **Martha Muñoz** worked in a research unit that focused on addiction at U. Maryland, Baltimore County. **Karen**

Gonzalez spent her summer at Rutgers University. **Rosa Ojeda** was at Scripps in San Diego. **Sheila Portillo** conducted research at UC Riverside. **Carissa Latiaille** worked in a neuroscience laboratory at UCSD, **Claudia Castaneda** worked at UCLA. **Danielle Robinson** spent the summer at U. MASS. Finally **Hugo Medina** had the most exotic summer research experience: he spent the summer in Argentina. Topics ranged from cell biology to human sexuality.

Not only students who are in programs designed to give them access to research go off to have great summer experiences. Anyone can apply to most of the summer positions. For example, **Sandra Escobar** spent the summer at the Ohio State U. in their Research Experience for Undergraduate Program. The research was on the regulation of transcription in fruit fly development.

Announcements for summer programs arrive in the MARC/MBRS office in early November, and applications are often due before February. Plan ahead for next summer. Most of the programs are for students with at least a year left before graduation. ♣

Biology major leads

Brian Nguyen, a senior at CSUN majoring in Biology, lives a dual life. Student by day, tango dancer by night. This summer, **Nguyen** competed in two competitions: the annual USA Argentine Tango competition, and the annual world Argentine Tango championship. The U.S. competition was held on July 22-24 in New York, and the world competition was held on the last week of August in Buenos Aires. **Nguyen** won first place in the U.S. competition and was a finalist in the world competition. It is rare for anyone from the U.S. to make it to semi-finals in Buenos Aires. ♣

Spring Grad Seminars

As of early September, the plan for grad seminars is as follows:

- Monday evening *Evo-devo* with Dr. Maria Elena de Bellard (BIOL 655C)
- Tuesdays afternoon *Sex determination* with Dr. Aida Metzenberg (BIOL 655D)
- Thursdays evening *evolutionary*

morphology with Dr. Fritz Hertel (BIOL 615B)

• Fridays midday *Bio-terrorism* with Dr. Mary-Pat Stein (BIOL 655B)☛

Reds, hydroids, cinema

This summer, Dr. **Janet Kübler** was invited to participate in the expert annotation of the *Chondrus crispus* genome at the Station Biologique de Roscoff in France. This is the first genome of a red seaweed to be completely sequenced. Roscoff is the marine laboratory of the University of Paris and is the largest marine laboratory in France with over 300 resident scientists. In addition to Kübler and several French scientists, the group included scientists from Korea, China, India, and Malaysia. While there, Kübler met up with CSUN alumna, **Stacy Krueger**, who is doing her doctoral research at the marine lab through the University of Paris.

Lareen Smith was awarded the Addison E. Verrill Visiting Graduate Student Fellowship by the U. of Maine's Darling Marine Center. Along with the prestige of the award, the fellowship of \$3400 provided for laboratory space, housing and supplies to support her research on morphological plasticity among genotypes of the hydrozoan, *Hydractinia polyclina*, in response to environmental variation. Smith spent 10 weeks at the Darling Center this summer conducting her research and talking with graduate students and scholars from Maine and other institutions around the country.

In addition to field research, members of the Kübler-Dudgeon family were in a movie filmed on Swans Island this summer. *The Tully Girls* is to be a docudrama about the lives of nine sisters that lived in southern New England in the period from 1790-1880. The production is intended for Connecticut Public Television. Dudgeon played the role of Samuel Selden Warner II, the son of the sister who narrates the story, and who served as a captain in the Marine Revenue Service during the Naval Blockade of southern ports during the Civil War.☛

Master teachers program in science teacher leadership—Dr. Gini Vandergon

was part of a team that designed and implemented a two-week institute focusing on science/math teacher leadership. The goals this year were how to be teacher leaders in high school settings. The program is part of a Masters in Science/Math Leadership at California State University, Dominguez Hills.

Noyce Scholars—This year we have added another four scholars to our cohort of Noyce science scholars bringing the total to eight. We will be joined by **Eric Blinder** (Biology), **Melissa Deitz**, (Biology), **Adorina Moshava** (Biology) and **Ray Oja** (Physics and Geology). This is a scholarship program for students who are preparing to be high school science or math teachers. We currently have six math scholars too. The program is NSF sponsored with co-PIs Drs. **Gini Vandergon** and **Matthew D'Alessio** overseeing the science scholars and running the science seminar. The next call for scholars will be at the end of the semester, you can find out more at www.csun.edu/math/noyce/.

San Fernando Valley Science Project

—This summer the focus of the SFVSP was on computer supported collaborative science (CSCS). Our SFVSP team ran a pilot program that focused on using technology to enhance student learning of science content and the nature of science. The program introduced classical lessons and labs to a set of middle school teachers where technology was used to integrate data collection, literature research, photography and other means of data analysis to demonstrate ways of teaching science. The teachers then observed a summer science class that was part of the Summer Academic Enrichment Program on the CSUN campus where they saw the CSCS model being used with middle school students. This was a ten-day workshop run by professors from the colleges of Education and Science and Mathematics: Drs. **Brian Foley** (Secondary education), **Norm Herr** (Secondary education), **David Kretschmer** (Elementary Education), **Henk Postma** (Physics), **Mike Rivas** (Secondary education), **Gerry Simila** (Geological Sciences), and **Gini**

Vandergon (Biology). Follow-up Saturday workshops are planned: www.csun.edu/science/csp.

CSET workshops—California Subject examination for teachers preparation workshops were taught this summer to prepare students for single subject credentials in science. The workshops were taught by Drs. **Norm Herr** (Secondary education), **Dorothy Ngyuen-Graff** (Chemistry & Biochemistry), **Gerry Simila** (Geological Sciences), and **Gini Vandergon** (Biology). Keep a look out for the next set of workshops this fall, flyers will be posted.

K-12 symposium—Dr. **Steve Oppenheimer** organized the annual K-12 Student Research Symposium. President **Jolene Koester** presented the keynote greetings.☛

Carpenter, Edmunds in China

Drs. **Robert Carpenter** and **Peter Edmunds** were part of a team of NSF scientists who traveled to China in August to meet with Chinese marine scientists. The goal was to identify potential areas for research collaboration.

The two-week trip included meetings with the Deputy Director of International Cooperation at the Chinese Academy of Sciences (CAS), meetings and tours of the Institute of Oceanology CAS, a workshop with coral reef scientists at the CAS Sanya Research Station on Hainan Island, and discussions with researchers at the South China Sea Institute of Oceanology in Guangzhou.

In addition to meeting interesting people and learning about their research, the warm hospitality at each location provided a very enjoyable experience and resulted in a strong foundation on which to further develop their joint research interests. While the two weeks were filled with meetings (and banquets), the group did have some time to explore some of the unique places in China including the Forbidden City, Tianamen Square, the Summer Palace, the Great Wall, the Ming Tombs, and finally Hong Kong.☛

A Carpenter summer

Summer 2010 was a busy time for research in the Carpenter lab. From May to July, the group traveled to Moorea to conduct long-term ecological research. Graduate students **Anya Brown**, **Jennifer Gowan**, **Maggie Johnson** and **Stella Swanson**, and technician **Vince Moriarity** spent long hours working on thesis projects and carrying out manipulative lab experiments on the effects of ocean acidification on coral reef algae.

Following the research stint in Moorea, Johnson then ventured to the University of Hawaii's marine lab in Kaneohe Bay to complete another lab experiment on the interactive effects of temperature and pCO₂ on rates of calcification of coralline algae. This portion of Johnson's research was supported by a Predoctoral Internship awarded by the CSU Chancellor's Office.

Results of all of this research will be presented at the upcoming Western Society of Naturalists meeting in San Diego. 🌱

Student Research Symposia

Last spring, there were two student symposia, one that was campus-wide and one that was sponsored by Sigma Xi, the scientific research society. The following Biology students won awards in their respective divisions.

- **Michael Kaufman** was a 1st place winner for "Neurogenic potential in the *spastic* Han-Wistar rat, a model of ataxic neurodegeneration."
- **Sofia Radillo** was a 1st place winner for "Integrating temporally regulated cyclopropane syntheses with bacterial cell cycle progression."
- **Carly Ryan** was a 1st place winner for "Measuring the heritability of plasticity in a model colonial hydrozoan, *Hydractinia symbiolongicarpus*."
- **Ishita Shah** was a 1st place winner for "Analysis of expression of Wild type and M712T GNE genes."
- **Jonathan Yarborough** was a 1st place winner for "Establishing a role for lipid biosynthesis in bacterial cell polarity."
- **Brian Idoni** was a 2nd place winner for "Quantitative evaluation of characterized alpha and beta glycosidase effects on sea urchin embryo cellular interactions"
- **Maggie Johnson** was a 2nd place

winner for "Impacts of diadematid echinoid grazing on photosynthesis of the crustose coralline alga *Hydrolithon onkodes* in southern Taiwan."

- **Christian Rodriguez** was a 2nd place winner for "Gene duplication of chalcone synthase in Hawaiian silverswords and California tarweeds"
- **Ruth Sepanian** was a 2nd place winner for "Novel methods for the synthesis of breast cancer aromatase inhibitors."
- **Kathleen Gherard** was a 3rd place winner for "Age, growth, and batch fecundity of the gulf corvina, *Cynoscion othonopterus*, from the northern Gulf of California, Mexico." 🌱

Promotions, other successes

Drs. **Tim Karels**, **Cindy Malone**, and **Mark Steele** have been promoted to Associate Professor.

Drs. **Bobby Espinoza**, **Dave Gray**, and **Fritz Hertel** have been made Full Professors.

The *Journal of the Marine Biological Association*, dates back to 1887 with an excess of 5900 articles published. A link to the most cited JMBA paper of all time returns the #1 ranked paper as one that Dr. **Janet Kübler** co-authored in 2000 with John Raven and John Beardall entitled, "Put out the light, and then put out the light." This paper discusses the lowest photon flux densities at which marine photosynthetic organisms can survive. 🌱

Chicano, Native Am. Scientists

The annual meeting of SACNAS will be held September 30 to October 3 at the Anaheim Convention Center. Students get to present their research, meet leading scientists, and talk with recruiters from leading Ph.D. programs. If you're interested in joining CSUN's delegation, email mariaelena.zavala@csun.edu 🌱

On to professional schools

Dr. **Terri Richardson**, one of CSUN's health professions advisors, is very pleased to announce acceptance statistics for CSUN students who sought advisement in the Health Professions office and then applied to professional school in the 2009-2010 application cycle:

25 students applied to medical school – 13 undergrads and 12 post-baccalaureate students. Of the undergrads, seven of them (46%) went on to medical school in fall 2010. Of the post-bac students, seven (58%) went to medical school. (The national average of students entering medical school last year was 43% of those who applied.)

The medical schools our students are now attending include the U. of Toledo, Touro U. – California (D.O Program), Michigan State U. (M.D. & D.O. programs), and Ross U. School of Medicine (Caribbean). In addition, one student applied to M.D./Ph.D. schools and was accepted to a Ph.D. program at USC. Finally, students who did not gain acceptance were interviewed at and waitlisted to the U. of Iowa, USC, Albany Medical College, and New York Medical College.

In addition, 26 students who received advisement in our office applied to dental school last year: 23 undergrads and three post-baccalaureate students. Of the undergrads, 11 (48%) have entered dental school this fall. Of the post-bacs, two of them (67%) have been accepted. (The national average of students who applied that matriculated to dental school last year was 37%.)

The dental schools our students are now attending include USC (6!), Tufts, Temple, UCSF, Oregon Health Science U., U. of the Pacific, and Nova Southeastern U.

In addition, one student has been accepted to podiatry school.

Many thanks go to all of the faculty who supported these students and helped them realize their dreams. 🌱

Alumni News

Jenieke Allen and **Justin Dreyfuss** (both advised by Oppenheimer) are starting Ph.D. study at USC. They both got full fellowships. **Oscar Nnoli** (advisor Medh) has move to Baltimore and entered Johns Hopkins master's of public health program. **Leticia "Ruby" Carrillo** (advisor Summers) is now at Michigan State U. She was also awarded a full fellowship to do a Ph.D.

Josephine Allen is a former CSUN student. She has recently accepted a tenure-track position at the U. of Florida

after earning her Ph.D. from Northwestern. Allen worked in the lab of Dr. MariaElena Zavala, and she was one of the first students supported by the Bridges to the Ph.D. program.

Dr. **Mia Adreani** has temporarily come back to CSUN after finishing her Ph.D. work at Florida State U. She joins the Steele lab as a postdoctoral scholar. Adreani is an expert on fish reproduction. ♣

Grants

Drs. **Robert Carpenter** and **Peter Edmunds** have been awarded a new grant from the NSF for \$2 million for a 4-yr project to investigate the effects of ocean acidification on coral reefs. The project, entitled “The effects of ocean acidification on the organismic biology and community ecology of corals, calcified algae, and coral reefs,” will be centered in Moorea and complement research being conducted by the NSF-funded Moorea Coral Reef LTER program. This grant is part of a new Global Climate Change Initiative at NSF. The new grant will support a postdoctoral researcher, a full-time technician, and several graduate and undergraduate students.

Drs. **Robert Carpenter** and **Peter Edmunds** are two of the principal investigators of the Long-Term Ecological Research program that has been renewed for funding by NSF. Initially formed in 2004, the project is cooperative with scientists at UC Santa Barbara and includes researchers from UCSB, UC San Diego, UC Davis, UC Santa Cruz, Duke U., CSU San Marcos, and the U. of Hawaii. The goal of the program is to quantify long-term patterns of change in coral reef communities and investigate the processes and mechanisms driving these changes. This goal is particularly relevant to coral reef ecosystems that are being subjected to a range of stressors that imperil their persistence. The CSUN portion of this grant will support a full-time technician and a host of graduate and undergraduate students who will conduct research on the coral reefs of Moorea.

Drs. **Janet Kübler** and **Steve Dudgeon**, with colleagues at the U. of

South Alabama, have been awarded a NSF grant entitled, “Effects of PAH exposure on aquatic plant community structure, productivity, and resilience” for \$117707. The aim of the project is to study the immediate effects that the Deep Water Horizon oil spill has on aquatic plant productivity, growth and survivorship, and the dynamics of aquatic plant communities in the Mobile-Tensaw Delta ecosystem along the Alabama Gulf Coast.

Dr. **Steve Dudgeon** and collaborator Peter Petraitis (UPenn) have been awarded a NSF grant through the Long-Term Research in Environmental Biology Program, entitled, “Experimental tests of alternative states on rocky intertidal shores.” The grant is for \$425136 over 5 years. The aim of this project is to both re-establish experimental manipulations in half of the original plots to compare their trajectories with experimental plots no longer being manipulated, and to establish new experiments to test the range of environments over which alternative states occur in natural ecosystems.

The Minority Access to Research Careers program was renewed for five more years. The program was awarded over \$3 million for student development and to improve student success in the college. Dr. **MariaElena Zavala** is the program director.

Dr. **Gini Vandergon** has been racking up large and small grants: (1) A California Science Project grant entitled “San Fernando Valley Science Project” \$70000; (2) Funding from the California Post-secondary Education Commission, Teacher Retention Initiative \$30000; (3) A campus grant for a Service Learning scholar – \$1500 to **Samantha Farkas** to help put together a science day for high school and middle school students connected with Tomorrow’s Scientist program; (4) A Discipline Oriented Service Learning campus grant for \$2000 to support the Tomorrow’s Scientists program; (5) \$1500 from Instructionally Related Activities to support the production of lesson plans for the Tomorrow’s Scientists pre-service teachers and middle school teachers.

Lena Coleman received \$600 from the California Native Plant Society.

Katherine Gould received a Leslie Family Scholarship for \$1500.

The Dean has funded three Biology graduate students with \$5000 fellowships for Outstanding Research Promise in Science and Mathematics. They are: **Anya Brown**, **Beck Wehrle**, and **Denita Weeks**.

Denita Weeks is also the very proud recipient of the Gaige Fund Award given by the American Society of Ichthyologists and Herpetologists (\$500).

Christina McNeal found two sources of funding: a fellowship from the Toluca Lake Garden Club for her interest in horticulture (\$1500); and a grant to study the impact of invasive grasses on *Ephedra californica* at the Carrizo Plain National Monument (\$4000).

Dr. **Sean Murray** received supplemental NIH grant for \$69000. The parent grant is entitled, “Integrating lipid biosynthesis with the bacterial cell cycle.”

Drs. **Michael Summers** and **Sean Murray** were each awarded \$15,000 grants from CSUPERB.

Dr. **Polly Schiffman** was awarded \$1000 in the competition *Writing and reading across disciplines, discourses, and divides*. The money will be used to in a project to increase ‘population thinking’ in students taking Evolutionary Biology.

Four profs were given minigrants from the Office of Research and Sponsored Projects: **Paul Wilson**, **Steve Dudgeon**, **Robert Espinoza**, **Gini Vandergon**. ♣

It really adds up!

Faculty in the Department of Biology have received an astounding number of large grants over the last five years, adding up to \$13,971,016. Without such grants, we could not possibly do the many special research projects, teacher training workshops, and programs for the under-privileged that have so improved our core job of teaching college classes. Note that funding received by the Department through the state and student fees has decreased in each of these five years. Clearly, the Department’s work and funding for that work is slowly changing in character. It is a happy observation that the faculty are adapting. ♣

Botanic Garden attracts funds

The Southern California Horticultural Society, an organization composed of professional and amateur plant enthusiasts, has honored the Botanic Garden with an internship this year. The intern, **Christina McNeal**, has undertaken the project of converting a grassy area to a flowery garden of California natives. In conjunction with the new garden, McNeal is preparing interpretive signage to further enhance the visitor's experience. McNeal will also give a brief PowerPoint presentation at one of the Society's monthly meetings. 🌱

Bridges to stem cell research

Our first cohort of students have begun their internships in stem cell biology labs at UCLA. The program is funded by the California Institute of Regenerative Medicine.

Our CIRM Bridges scholars spent the first part of this past summer taking an

intensive six-week course in Cell and Tissue Culture and then went on to take an even more intensive training course called "the Stem Cell Core Human Pluripotent Stem Cell Culture" at the USC Eli and Edyth Broad Center for Regenerative Medicine and Stem Cell Research.

The scholars were then matched with UCLA faculty mentors engaged in regenerative medicine research and are now working at the cutting edge of science.

Our graduate CIRM Bridges Scholars, their CSUN mentors, and their UCLA mentors and departments are as follows: **Adelaja Akinlolu** (Cindy Malone and Bill Lowry, MCDB), **Tannaz Faal** (Cindy Malone and Harley Kornblum, Mol. & Med. Pharmacology), **Danielle Lalimar** (Paula Fischhaber and Luisa Iruela-Arispe, MCDB), **Emily Mercer** (Jheem Medh and Amander Clark, MCDB), **Destaye Moore** (Paula

Fischhaber and Ben Novitch, Neurobiology), and **D. Roo Wisidagama** (Cindy Malone and Mike Teitell, Path and Lab Medicine).

Our undergraduate CIRM Bridges Scholars are mentored by Cindy Malone at CSUN and their UCLA mentors and departments are as follows: **David Gibbs** (Antoni Ribas, Medicine-HemOnc), **Behrod Katebian** (Don Kohn, MIMG), **Joseph Mendelis** (Rob MacLellan, Medicine-Cardiology), and **Terry Milligan** (Gay Crooks, Path and Lab Medicine).

Scholars' progress in their internships will be highlighted in poster presentations in the upcoming CSUPERB Symposia in January 2011. More information and the application for the Fall 2011 cohort are currently available at the Biology Department website. 🌱

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