

Santa Clara BioNews

Spring 2007 volume 3, issue 2

Santa Clara University Department of Biology

WHAT'S INSIDE...

FACULTY SPOTLIGHT
ALUMNI PROFILES
ACADEMIC SCHEDULE



The Bio News "Staff"

Craig Stephens (Chair, Biology) cstephens@scu.edu
Cena Hoban (Admin Assistant, Biology) choban@scu.edu
Michelle Pesce (SCU Biology '09) mpesce@scu.edu
Andrew Vu (SCU Biology '09) aavu@scu.edu
Cynthia Dick (SCU Biology '08) cdick@scu.edu

UPCOMING EVENTS

RESEARCH SEMINARS

Monday, May 21 at 4 pm Daly 201

Tom Finsterbach (SJ, PhD)
Stanford University

"Phasic Treatment of the Failing Heart: Translating Lab Research into Patient Care Innovation"

Thursday, May 24 at 4 pm Daly 206

The 2007 Regan Lecture

"Slipping Into the Mainstream: Where Science Meets Policy"

Dr. Donald Kennedy

(Reception will follow in the lobby of the Arts and Sciences Building)

Dr. Kennedy is Editor-in-Chief of Science magazine, perhaps the most influential scientific journal in the world. Dr. Kennedy is also former President of Stanford University, a distinguished biologist, and a major public voice on the intersection of science, ethics, and policy.

Biology 100 series presents:

Wednesday May 23 at 5pm Alumni Science 120

Dr. Justin Courcelle,
Portland State University

"Therefore, what are recombination proteins there FOR?"

MARK YOUR CALENDAR!

PIZZA WITH THE PROFS:

MONDAY JUNE 4TH

11:30 -1PM

ALUMNI SCIENCE COMMONS.

FREE PIZZA!



Environmental Studies upcoming courses:

ENVS 141 Environmental Biology in the Tropics
1st session June 25-29th

2nd session July 1st -24th in Costa Rica

ENVS 39/ARTS 34 Drawing from Nature
Fall 2007 TR 9:55-11:40

FACULTY NEWS

Now Hiring...

The Biology Department is happy to announce that Dr. Katherine Preston and Dr. Christelle Sabatier will be re-joining us for the 2007- 08 academic year. Katherine will be co-teaching *Bio 173: Evolution* in the fall, along with a new non-majors course, *Bio 27: Edible Botany*. She will then teach Bio 22 and Bio 23 during the winter and spring quarters. Christelle will be teaching Bio 24 in the fall, Bio 25 in the winter, and *Bio 122: Neurobiology* in the spring. Welcome back, Katherine and Christelle!

We're happy to announce that during the upcoming fall quarter, we will offer *Bio 114 Immunology* for the first time ever as a lab course, thanks to Dr. Tracy Ruscetti. Tracy is a part-time instructor currently teaching *Bio 175 Molecular Biology* here, and we're very happy that not only is she coming back in the fall, but that she will be developing this new laboratory opportunity focusing on molecular and cellular immunology.

Also joining us to start a new tenure-track position in the fall will be Dr. Justen Whittall (SCU '95), who is currently a post-doctoral research scientist at UC-Davis. Justen has established himself as an outstanding young scientist in the field of evolutionary biology, and we're very excited to have him come back to SCU, where his scientific career started. (You may remember that Justen was the subject of an Alumni Profile last year in BioNews.) Justen will be teaching *Bio 173 Evolution*, Bio 22, and *Bio 178 Bioinformatics* this coming year. Welcome, Justen!



CONGRATULATIONS!

To all the Biology majors
who will be graduating on
June 16, 2007!

Please join us after graduation
for a reception

in front of the Alumni Science Commons.

*Sponsored by TriBeta



FACULTY SPOTLIGHT



Dr. Elizabeth Dahlhoff

By Cynthia Dick (SCU '08)

Dr. Elizabeth Dahlhoff, an Associate Professor in the Biology Department, has a very broad background in biology. After receiving her B.A. in Chemistry and Biology from UC Santa Cruz, she went on to get her Ph.D.

in Marine Biology from Scripps Institution of Oceanography.

Interest in Biology

Dr. Dahlhoff first became interested in biology in high school after she was picked to enter into an honor's research program, which was run by a very dedicated Physics teacher. During the program, she spent three of her spring breaks at the Southwest station for the Museum of Natural History in Portal, Arizona. At the station, she and her classmates learned about water chemistry, microbiology, and hydrodynamics. Her specific interest in marine biology, however, came as a result of summers she spent in North Carolina at the beach.

Area of Research

Dr. Dahlhoff is interested in the mechanisms that allow animals to adapt to their environment. She takes a "molecules to ecosystems approach", and is especially interested in how animals respond to changes in environmental temperature. She originally studied marine organisms, like those at hydrothermal vents and in the rocky intertidal, which experience a wide range of temperatures. However, for the past 10 years, she has studied the evolution "in action" in Eastern Sierra Nevada populations of willow beetles. Genetic variation in these beetles changes in response to climate, and physiological (heat shock proteins), performance (running speed) and fitness differences (like fecundity and mating success) depend both on this genetic variation, and on the beetles' rapidly-changing environment. Dr. Dahlhoff and her colleagues use this beetle system as a natural model for understanding the impacts of climate change on natural systems.

Teaching at Santa Clara

Before coming to Santa Clara in 1997, Dr. Dahlhoff taught at Oregon State and Sonoma State Universities. She prefers SCU for several different reasons. Since SCU is a smaller school, Dr. Dahlhoff feels she is able to connect with students more and be inspired by them. Students care more about the problems of today and are generally more ready for college work than at her two previous universities. She gets to teach what she wants and had a lot of support from SCU to take risks in her research and switch her system of study. Dr. Dahlhoff acknowledges that her classes are difficult, but she still recognizes the importance of having fun. In addition to teaching the learning objectives, she tries to teach students in her classes to live thoughtfully and advises

them to do what you love and what you're good at, not what you think you should do.

"Do what you love and what you're good at, not what you think you should do."

If you have not already, I strongly recommend taking a class from Dr. Dahlhoff. She is an extremely dedicated teacher and you are guaranteed to learn a lot in her class. Next year, she will be teaching Bio 21, Bio 6: The Oceans, and Bio 180: Marine Physiological Ecology.

ALUMNI PROFILES

Lorena Mora-Blanco (SCU '01)

Corey Morris (SCU '03)

Desiree Yang (SCU '03)

By Andrew Vu (SCU '09)



SCU Biology alumni Lorena Mora-Blanco, Corey Morris & Desiree Yang

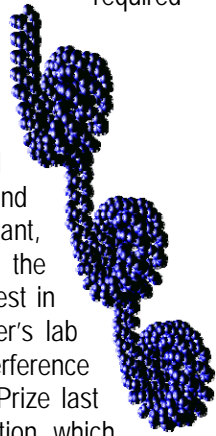
Every year, SCU Biology alumni head to graduate schools around the country. Remarkably, three of them who took courses together at SCU - Lorena Mora-Blanco, Corey Morris, and Desiree Yang - have rejoined nearly 3000 miles away in Cambridge, Massachusetts, at Harvard University. Andrew Vu spoke recently to the "Harvard crew" for BioNews.

Why did they decide to pursue Ph.D. degrees? Corey, Lorena, and Desiree all found they loved scientific research here at SCU. Corey actually started doing research in high school, in a summer program associated with the Human Genome Project at the University of Washington. As a sophomore at SCU, he joined Dr. Leilani Miller's lab, where he worked until graduation, and then another year after that with Dr. Miller as a research assistant. Lorena got her start in research through Dr. Miller's Project Lab course. The summer after graduation, she continued to work in Dr. Miller's lab, and then went on to work at a biotech company (Exelixis) for two years, followed by a brief stint at UCSF. Desiree discovered her love of research through work with Dr. Craig Stephens. After graduation, she worked as a research technician in an immunology lab at UCSF for two years.

Lorena wants current bio majors to know that even if the path is rough, you can still get to a place like Harvard. She was always attracted to science, but she struggled her first few years at SCU,

and started to question whether she was capable of a scientific career. But she loved the more advanced biology courses and labs, especially in areas like molecular biology and genetics, and her grades improved. Project Lab and the opportunity to do independent research really clicked with her. Her dedication continued to grow after graduation. According to Lorena, "The goal of getting a Ph.D. is to be able to think for yourself, troubleshoot, and become independent. You have to figure out how you want to design your own experiments. It's different from being told what to do."

What are they working on now? Corey is doing his dissertation research in the laboratory of Dr. Danesh Moazed, in the Department of Cell Biology. According to Corey, "The laboratory's main focus is the process of heterochromatin formation and how RNA interference (RNAi) factors contribute to this process. Using the fission yeast *Schizosaccharomyces pombe*, I'm investigating protein complexes and DNA sequences required for centromere function. Eukaryotic centromeres contain a specialized chromatin structure, and are the region upon which kinetochores assemble, directing the faithful segregation of chromosomes during mitosis and meiosis. Specifically, I'm seeking to understand more about how the conserved histone H3 variant, CENP-A, is deposited and maintained at the centromere." Several factors propelled his interest in this topic. Working with *C. elegans* in Dr. Miller's lab made him aware of recent advances in RNA interference (RNAi), a technology recognized with a Nobel Prize last year. His research also focused on gene regulation, which he enjoyed. Finally, when he started graduate school there was a lot of excitement about emerging roles for non-coding RNAs. Together, these factors sparked his interest in studying how small RNAs initiate heterochromatin formation and affect gene expression.



Lorena is also working on chromatin dynamics, in the lab of Dr. Charles Roberts in the Department of Biological Chemistry and Molecular Pharmacology. She's studying the SWI/SNF chromatin remodeling complex, and particularly protein SNF 5, which functions as a tumor suppressor. SNF 5 helps to move nucleosomes around to control the accessibility of DNA for the transcriptional machinery. Her work is a combination of cell biology, molecular biology, and biochemistry.



Desiree's research is in the field of molecular microbiology, focusing on regulation of microbial virulence. The main pathogen that she studies is *Vibrio*

cholerae, which causes watery diarrhea by producing cholera toxin. The bacteria only produce the toxin after entering the host, but regulation of virulence in *V. cholerae* is not well understood. Working in the laboratory of Dr. Deborah Hung in the Department of Molecular Biology, Desiree hopes to identify factors that regulate production of cholera toxin. She became interested in microbial pathogens while studying microbiology at SCU. Just as

Corey and Lorena appreciate the relevance of their research to understanding cancer, Desiree finds host-pathogen interactions fascinating, and hopes that her research might someday be applied to alleviate human suffering. Cholera is a major cause of death among children in the developing world, where people are often exposed to contaminated water. Desiree says that "It's not practical to say that you're going to find a cure for a disease, but everyone who works on this contributes to the future cure, which will eventually help people."

How do they spend their time? All three of them have finished most of their coursework, which is done mostly during the first two years of the 4-6 years it takes to earn a PhD in biology. Lorena commented that "you just have to finish classes before they'll sign the papers for you to graduate – they're really pretty relaxed about when you actually take the classes. There is one required class everyone has to take, and everything else is elective, although the school recommends that you take classes in your weak spots."

They have also completed the dreaded "qualifying exams," so they can now focus on their dissertation research. All of them say that their typical day revolves around whatever experiments they have going on. Corey adds that days are "broken up by the occasional seminar, lab meeting, journal club, and Tuesday and Thursday 'tea time'." Lorena enjoys the freedom of being able to get up whenever she wants, but she still likes to go in early and get things done. While experiments are running in the background, she reads lots of journal articles - she gets emailed tables of contents for nearly every scientific journal in the fields she's interested in, so she can keep up with current work from other labs. She spends 8-12 hours each day in the lab, but she doesn't like to "overdo it." "If you're in the lab for too long, you get so tired you lose the benefits of being there. Have a list of things you need to get done that day, and get them done before you end the day." She also likes to hang out with friends after the day is over, and believes you need to have some balance in life to avoid burn-out.

What do they enjoy about their work, and what are some of the challenges they face? Like many grad students, Lorena and Desiree appreciate the flexibility and independence of graduate school, the attitude of exploration, and the encouragement to think about scientific problems and ways to address them. Lorena meets with her advisor to talk about experiments, then sets up her days however she wants. She says that "it's up to me to graduate at some point". Successful grad students have to *want* to put in the hours needed to create a body of work that will allow them to finish the degree. Desiree is very glad to have found such a passion for research: "As a grad student, you have to be determined and focused. Since the hours are flexible, you can fall into a trap where you don't go to the lab enough because nobody is keeping track of you, so you don't get your work done." Corey completely agrees: "Success in graduate school has to do as much with your determination as with your intellect."

Corey also noted the rare satisfaction of discovering new knowledge. "As a scientist, I really feel I have a privileged access to the inner workings of life. Science is unlike any other

profession in the latitude afforded creative thought and action. There's nothing quite like doing an experiment that you're confident no one in the history of humankind has known the answer to—or answering a question that only 50 years ago would have been unimaginable. Many professions utilize knowledge, but very few actually expand humankind's understanding."

The biggest challenge is that experiments don't always work. In fact, Lorena says that "experiments go wrong a lot more often than they go right!" Obviously, this can be frustrating, but Lorena counts herself as fortunate to have "a nice advisor who is patient and listens, and really nice lab mates who are very supportive," in contrast to some labs that are very competitive. When things don't work, she says "you take a deep breath, and you want to go back in again, because you want to know what the answer is. If you enjoy the science, the questions will really draw you in."

Corey adds that "Another struggle is dealing with the stress that comes when you learn that other research groups are pursuing very similar questions to your own or when a paper is published that "scoops" some aspect of your research."

What advice do they have for students interested in a career in research and applying for grad school? These alumni enthusiastically believe that SCU prepared them well for their current work, and that undergraduate research was critical. According to Corey, "Santa Clara provided a rigorous education, and my experience in the Miller lab was invaluable. I came very well prepared." Lorena agrees that SCU gave her a good background in through coursework, and that working in Dr. Miller's lab helped give her the background and basic training for the work she is doing now. Desiree adds that she was thankful that the Biology Department at SCU was a supportive environment, where the professors knew her by name and wanted her to succeed.

Corey advises students interested in careers involving lab research to "do everything you can to be sure that bench science is your passion. The only way to determine this is to have worked full time in a laboratory and have enjoyed the work. While the 'ah-ha' moments of discovery are exciting, they are fleeting and far between. You must enjoy the process—not only thinking about experiments, but actually doing them. You can't pursue a Ph.D. because you think it's the obvious next step in a career trajectory!"

To get your research career off on the right foot, Lorena suggests that you "make sure you learn how to do things the right way the first time. As you gain experience, you can learn to take shortcuts, when you're an expert at the experiment... You have to understand why you're doing what you're doing – then it's easier to understand why things go wrong when they do! Also, be bold – don't be afraid of doing something you've never done before."

As for figuring out what to do after graduation, Desiree thinks that it is a good idea to take a break from school and explore different fields. "Talk to people who are established in their field, have gone through the process, and know what the field is like to work in." She feels blessed to have had good mentors at SCU, who inspired her to go to graduate school, but she is also very glad to have taken time after graduation to work at UCSF, and figure out what she really wanted to do. She thinks that it's valuable to take

opportunities to explore other parts of the country, or the world, before deciding on a set career. "If you're not 100% sure, it's best to take time off and discover what else is out there until you find what you really want to do. Don't feel rushed to make a decision."

Corey notes that there are quite a few "very good graduate programs in the biological sciences." He adds, "as long as you are looking at well-respected graduate programs, I believe that more important than the actual program is what laboratory you join. Although you may not know exactly what type of research you would like to do, make sure the program has several labs doing research that you could see yourself doing. You want to have [several] possible dissertation labs to choose from, because you really won't have a good sense of the working environment until you do a rotation in the laboratory. Keep in mind that this is where you'll work for several years. You not only want the research to be stimulating, but you want to make sure that you get great scientific training in an environment that is most conducive to your personal learning style. In the end, choosing a graduate school comes down to a combination of both academic and non-academic factors. I was interested in having breadth of exposure not only scientifically, but also across humanities disciplines; thus, I focused largely on programs that were closely affiliated with a college or university, as opposed to dedicated research centers. Had I not been exposed to programs other than my own, I wouldn't have met my fiancé, who is graduating with an M.D. from Harvard Medical School this year!"

If you are interested in grad school but don't think you'll be able to get in, Lorena wants you to know that nothing is impossible! She applied to at least 15 graduate programs, not convinced she would get into *any* of them. With a 3.1 GPA, she feared she wouldn't be competitive for admission, even though she had decent GRE scores. In the end, she was accepted to nearly all of them! What she hadn't counted on was the importance of her research experience at SCU, Exelixis, and UCSF. Her enthusiasm for science came through in her application, and her research experiences probably earned her strong letters of support from her supervisors. Choosing to go to Harvard was surprisingly hard – she loved living in the Bay area, but she eventually decided that Harvard was a great opportunity to go somewhere new, and experience a different lifestyle, for a while at least. She was afraid that people at Harvard would be snobby, but that fortunately didn't turn out to be true! She has also found that, like Corey and Desiree, she was as well prepared to handle the academic demands of grad school as any of her peers.

For more information on Corey's research, check out his recently published review article: Morris CA and Moazed D (2007) Centromere assembly and propagation. *Cell*. 128(4):647-50. You can find information on his lab at <http://cellbio.med.harvard.edu/faculty/moazed/>

If you would like to contact Desiree, she is happy to answer any questions. Her email address is desireeyang@gmail.com You can find information on her lab at <http://ccib.mgh.harvard.edu/hunlab.htm>

Lorena can be reached at elblanco@fas.harvard.edu

You can find information on her lab at http://www.hms.harvard.edu/dms/bbs/fac/roberts_Charles.html

Summer Courses

Session I

Bio 2 Human Health/disease TR 6-9pm Murray
Bio 112 Pathogenic Micro L+L MTR 8-10:10am Murray
Bio 112 LABS TR 10:20-1:20pm Murray
Bio 124 Human Physiology L+L TWR 3:20-5:30 Courtney
Bio 124 LABS TR 12-3pm Courtney
Bio 124 LABS TR 6-9pm Courtney

Session II

Bio 4 Light & Life L+L MTR 10:20-12:30 Preston
Bio 4 LABS TUES & THURS 1:30- 4:30 Preston

Fall Quarter 2007

Non Majors Courses

Bio 4 Light & Life L+L MWF 9:15-10:20 Eisinger CASA 7
Bio4 LABS TUES OR THURSDAY 2:15-5:00 ALMSC 262
Bio 18 Exploring Biotech L+L MWF 11:45-12:50 Wong ALMSC 120
Bio 18 LABS TUES OR THURSDAY 1:45 -4:45 ALMSC 125
Bio 27 Edible Botany TR 1:45- 3:30 Preston ALMSC 120

Biology intro series

Bio 21 Physiology MWF 9:15-10:20 Dahlhoff ALMSC 120
Bio 21 Physiology MWF 10:30-11:35 Dahlhoff ALMSC 120
Bio 21 Physiology MWF 1:00-2:05 Dahlhoff ALMSC 120
Bio 21 Physiology TR 9:55-11:40 Tauck CASA 7
Bio 21 Physiology TR 11:50-1:35 Tauck CASA 7
Bio 21 Physiology TR 6:00-7:45 Tauck CASA 8
Bio 24 Cell Biology/Genetics MWF 9:15-10:20 Sabatier DALY 203
Bio 24 Cell Biology/Genetics MWF 10:30-11:35 Sabatier DALY 203
Bio 24 Cell Biology/Genetics TR 9:55-11:40 Grainger ALMSC 120
Bio 24 Cell Biology/Genetics TR 11:50-1:35 Grainger ALMSC 120

Upper Division Courses

Bio 113 Microbiology L+L 6:00-7:45 Murray ALMSC 120
Bio 113 LAB TR 2:15-3:45 Bryant ALMSC 361
Bio 113 LAB TR 4:00-5:30 Bryant ALMSC 361
Bio 114 Immunology L+L MW 1:00-2:45 SOBRATO C
Bio 114 LABS MT 3:00-6 Ruscetti ALMSC 302
Bio 127 Drugs & Toxins MW 6:00-7:45 Courtney ALMSC 120
Bio 171 Ethical Issues: Biotech & Genet TR 9:55-11:40 Miller DALY 202
Bio 173 Evolution L+L MWF 10:30-11:35 Whittall DALY 201
Bio 173 LABS MW 2:15-5 Preston ALMSC 359
Bio 175 Cell Biology L+L TR 11:50-1:35 Islas DALY 203
Bio 175 LABS TUES OR THUR 2:15-5 Islas ALMSC 301
Bio 189 Topics in Cell & Molec Biol F 2:15-3:50 Miller ALMSC 120

Tentative Winter Courses

3 Fitness Physiology L+L
6 Oceans L+L
19 Biology for Teachers L+L
22 Intro to Evolution & Ecology
25 Investigations in Cell & Molec Biology L+L
28 Human Sexuality
114 Immunology L+L
124 Human Physiology L+L
145 Virology
160 Biostatistics L+L
174 Cell Biology L+L
177 Biotechnology Lab L+L

Tentative Spring Courses

5 Endangered Ecosystems L+L
23 Invest. In Ecology and Evolution L+L
104 Human Anatomy L+L
110 Genetics L+L
111 Parasitology
115 Human Reproduction
122 Neurobiology L+L
131 Agroecology L+L
179 Cancer Biology
175 Molecular Biology L+L
178 Bioinformatics
180 Marine Physiological Ecology