PUC BIOLOGY NEWSLETTER

ISSUE 7 WINTER 2010

Greetings,

As I look West at the view from my office in Clark Hall and see the hills and trees in the distance I think of our many graduates, friends and supporters who have shared this view over the years. Clark Hall, built originally in 1930, and extensively remolded during the '97-'98 academic year continues to be home to the Biology Department. Just as the view to the West has changed little over the years so the fundamental purpose our department continues to be in harmony with those of you who preceded us in this beautiful place. Our fundamental purpose continues to be the "provision of an excellent education in the life sciences which is based upon the latest scientific discoveries and our belief in God as the Creator of life".

You will be pleased to learn that our students continue to perform well on the Major Field Test in Biology averaging above the 90 percentile for the past ten years on this nationally normed exam. The acceptance rates of our students into professional and graduate programs continue to be outstanding. In recent years we have also made a commitment to increase student research and internship opportunities. This Newsletter (as well as our previous Newsletter) highlights some of the research and internship activities conducted by students. We are also very happy to report an 18% increase in enrollment in the Biology Department this year.

The purpose of the Newsletter continues to be to keep you informed about your department since you left campus. You will also find further information and pictures on the PUC Biology Department web page. Thank you so much for your continued support and encouragement. We invite you to keep in touch with us.

"I will instruct you and teach you in the way you should go; I will guide you with My eye." Psalm 32:8 NKJV

Robin Vance, Biology Department Professor and Chair

2009 BIOLOGY GRADUATES

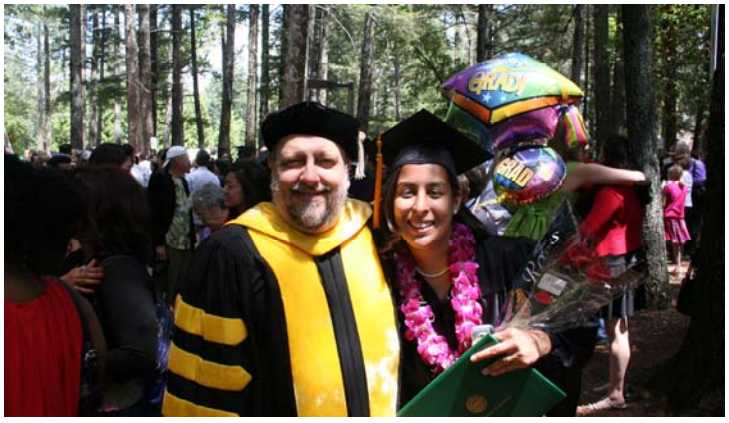
Stacy Catalon
Jaylene Chung
Daniel Conde
Adekunbi Egwahke
Shondene Griswold
Eric Kim
Michael Kim

Thirteen students graduated with a Biology degree in June 2009. Graduation is always a joyous time and we are proud of the accomplishments of these most recent graduates. However, it is with sadness that the faculty watch them leave our PUC campus and Clark Hall for the last time. Each of these students has left their mark on us and in our department and we miss them all!

To all of our alumni, please keep in touch and let us know what you are doing now.

James Lee
Erik Nevatt
Tom Nguyen
Sylvia Pham
Sara Richards
Natalie Valadez

The biology faculty pose with 2009 biology graduates. L to R: Brian Wong, Bryan Ness, Michael Kim, John Duncan, James Lee, Robin Vance, Daniel Conde, and Rajiv Ganesan. Not all graduates or faculty are pictured.



Bryan Ness poses with Biology graduate Natalie Valadez.

BIOLOGY PROFESSOR 2009-10 PUC EDUCATOR OF THE YEAR

Dr. Brian Wong was voted the 2009-10 "Educator of the Year" by PUC students. Dr. Wong was honored this past May during a special all-school Colloquy for his dedication and service to teaching and to our department.

The program included a "roast" by two students and Biology professors Robin Vance (Chair) and Floyd Hayes. These presenters mentioned the genuine care that Dr. Wong has for his students and his commitment to God and Adventist education. Brian Wong also is known for his fast-paced lectures, as a formidable tennis player, and as an accomplished fisherman.

Two of our other Biology faculty were selected as PUC Educator of the Year in the past six years: Robin Vance (2008-09) and Bryan Ness (2004-05). We are blessed to have a faculty that is committed to excellence in teaching.

Robin Vance and Brian Wong pictured at the 2009 PUC graduation ceremony. Dr. Wong was recently selected by PUC students as the 2009-10 Educator of the Year.

ENVIRONMENTAL STUDIES MAJOR DRAWS MORE STUDENTS

Now in its second year, the Environmental Studies program has seen a steady increase in majors. Currently nine students have declared an Environmental Studies major and we expect at least two seniors to graduate this June.

Thus far four students have begun their internships: Dustin Baumbach, who aspires to become a marine biologist, at the Marine Mammal Center; Stephen Grove, who aspires to become a land manager, at PUC's Land Management; Eric Heung, who aspires to become a physician, in a cancer laboratory at Loma Linda University; and Molly Reeves, who aspires to become a conservation biologist, at Safari West.

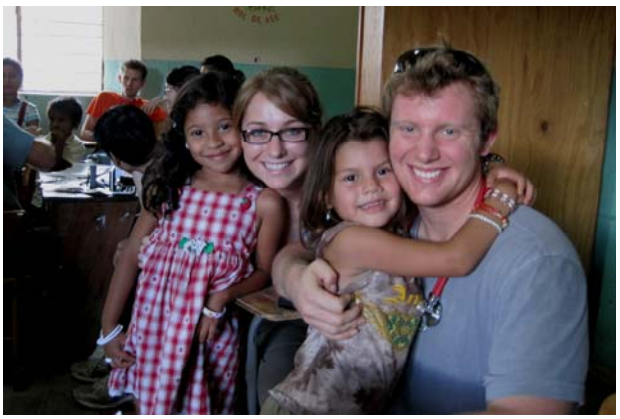
BIOLOGY STUDENTS GO ON MISSION TRIP TO HONDURAS

In total, 24 students from PUC spent part of their Christmas break in Honduras on a medical and dental mission through Global Medical Brigades. This trip was organized by several PUC students, including Senior biology majors Charles Raya and Kevin Tan.

By Brandon Noyes, Sophomore Biology major

Our first day in Honduras was spent settling into our environment, sorting and taking inventory of medications, and preparing for the next three days of brigades. Each brigade consisted of traveling 2-3 hours by bus to a central village in which the surrounding area's inhabitants would congregate. We set up stations inside schools: triage, doctor assessment, and pharmacy. Our second brigade was supplemented by another group's dental team who performed extractions and applied fillings for patients before they proceeded to triage. Whether it was translating patients' symptoms, taking blood pressure in triage, or filling prescriptions and distributing them from the pharmacy, everyone had a job and they performed with excellence. It was a very rewarding experience, and, thankfully, there will be another coming up later this year!

PUC students traveled to Honduras in December 2009 with Global Medical Brigades to provide medical and dental services to those in need.



Jessica Kremer and Brandon Noyes pose with two of the many children who received vitamins and parasite medicines from the doctor's office.

STUDENT RESEARCH & INTERNSHIP

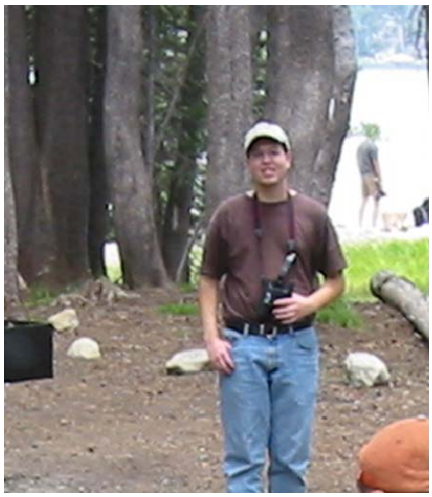
Four Biology majors wrote about their research experience in the 2009 Newsletter. All of these students have now graduated and continued on to professional or graduate school. As you read last year, research was a rewarding experience that gave each a chance to apply knowledge from the classroom to answer real-world questions. Once again, we are excited to bring you more three more stories of student research (Doug Weideman, Peter Han, & John Stewart).

We are also very pleased to present internship reports from two Environmental Studies majors (Molly Reeves & Dustin Baumbach). As part of the Environmental Studies degree requirements, students must volunteer service or be employed with an environmental government agency or non-government organization. This "class" is designed to provide students with experience that is relevant to future employment or graduate studies.

By Doug Weideman, Sophomore Biology major

Because I plan to be a field biologist, I am always interested in opportunities for research experience. One of the great things about Pacific Union College is the opportunity students have to work closely with their professors on research through programs such as summer internships. Last summer, I was given a research internship with the Biology Department. For two months I worked with Dr. Floyd Hayes studying birds. The main research project that I participated in was in Yosemite National Park. We studied how human food provided by tourists was affecting bird populations in the park. Specifically, we studied how the food directly altered the birds' behavior. We visited Yosemite twice during the summer, conducting 100 ten-minute point counts at 50 picnic sites, with two counts per site. At each site one count was made before picnickers arrived and one while picnickers were eating lunch. However, we still had enough free time to enjoy ourselves. During the afternoons we usually went rock climbing, typically one or two short climbs a day. Because Yosemite is near the southern end of the range of the Great Gray Owl, during the evenings we often hiked through the meadows looking for them, but sadly, no luck. However, we saw a lot of other wildlife such as black bears, mountain kingsnakes, and lots of high elevation birds including Hermit Warblers, Townsend's Solitaires, and Pine Grosbeaks. After returning to PUC, we analyzed and examined trends in our data. Certain species of birds were clearly attracted to the presence of human food. We are now preparing a paper that we hope to publish in the near future.

A female Sooty Grouse at Glacier Point in Yosemite National Park. Photo by Floyd Hayes.



Doug Weideman keeps track of birds visiting picnickers in Yosemite National Park. Photo by Floyd Hayes.

When we were not in Yosemite, we did additional research at Clear Lake, in Lake County, about an hour's drive north of Angwin. We studied the breeding populations of fish-eating waterbirds at the lake. Because the fish population fluctuates greatly from year to year, we initiated a long-term study to learn how variation in fish populations affects breeding success. We located and surveyed breeding colonies of herons, egrets, and grebes both from land and by canoe. The canoe surveys were the most fun. We were able to get close to the colonies as well as see other wildlife such as a family of river otters. We also conducted censuses of the gull population on the lake once a month as part of a long-term study of gull population dynamics at Clear Lake.

It was a fun and busy summer and I learned a lot about research methods and techniques. Inspired by a bizarre observation last winter of a gull with heterochromia of the eyes (one yellow, the other brown) and legs (one yellow, the other green), we have subsequently compiled a few dozen new case reports and submitted a paper for publication. This winter we have been studying the frequency of heterochromia in different species of gulls, testing the hypotheses that heterochromia occurs more frequently in species with pale eyes than in species with dark eyes, and more frequently in adults than in immatures. The internship and extracurricular research projects during the school year helped confirm my decision to become a field biologist, and I look forward to doing more research here at PUC.

STUDENT RESEARCH & INTERNSHIP

Peter Han has spent time working at a genomics lab in San Diego and also produced an award-winning public service announcement. He is also the current Biology Club president.

By Peter Han, Sophomore Biology and Film major

During spring quarter's finals week in 2009, I postponed my BIOL 113 final and caught a flight to Washington D.C. to attend the National Geographic Explorers Symposium, a private conference where some of today's most exciting scientists came and presented their recent work. As part of my first place prize for the National Geographic Film/ PSA Competition, I was invited to come and listen to these explorers articulate their quests searching for Genghis Khan's grave in Mongolia, trekking through South American jungles for the cause of the next epidemic, or diving in the Pacific Islands for coral reef conservation. It was awe-inspiring to listen to these veteran scientists--scientists quite contrary to the crazy haired, lab coat scientist stereotype. The presentations given reinforced the image that science isn't just about stooping over petri dishes or micro-pipetting primers into hundreds of tubes, but rather, exploring and investigating the unknown.

This summer, I also had the unique opportunity to work with a researcher at a local genomics lab. While my participation was not classified as a formal internship due to the company's guidelines and time concerns, I met with the researcher on a weekly basis and assisted her with some of the tasks associated with her job. We studied non-synonymous nucleotide polymorphisms (nSNP) which cause amino acid substitutions; accordingly, these nSNPs or "snips" cause changes in protein function (A common example is a single "snip" in hemoglobin that results in sickle cell anemia). I learned quite a bit about diseases and how these miniscule changes in genome can have great holistic effects.

I worked a lot with the NCBI (National Center of Biotechnology Information) protein and gene database, the OMIN (Online Mendelian Inheritance in Man) database, and the HGMD (Human Gene Mutation Database), looking up amino acid sequences and searching within these sequences for specific mutations--mutations that are known to cause disease. Using a well-known program that my researcher had written, we checked if a protein, or genome, sequence would be "tolerant" or "intolerant" of a mutation in a single base pair of DNA. I made a small application that made it easier to create text files that consisted of a protein and its genetic code. These text files were used by my researcher to efficiently input and analyze the code. I also drew the illustrations for her paper that was published in Nature Magazine. Using my film background, I also started to create some instructional videos on how to use her web-based program.

This past summer was delightfully filled with science and biology and I look forward to spending more time in research.

John Stewart was an Undergraduate Fellow at Loma Linda University in summer 2009.

By John Stewart, Senior Biology major

I spent this last summer in Loma Linda. I did not, however, have to deal with the heat. I spent the majority of my time in a cave, deep under the Medical Center, in the Center for Perinatal Biology, Lab K, far from any window. Six months prior I went through the application process for an Undergraduate Fellowship through the American Physiology Society. Dr. Lawerence Longo, an icon at Loma Linda University, worked with me through the process providing information about his research and the research opportunity he could provide. His ongoing projects have typically involved sheep; my projects, however, were with mice.

I was able to work on two separate, but related, projects. The first dealt with changes in behavior in hypertensive mice. Over a course of about four days we tested anxiety, activity levels, spatial memory, and coordination with a help from the psychology department. My second project was to test for differences in gene and protein expression in the livers of mice exposed to low protein levels during gestation.

When I started in the lab I felt a little overwhelmed by all the techniques I had to learn. I was, however, prepared by my courses at PUC, to understand the concepts underlying my research. Dr. Robin Vance taught me how the Renin-Angiotensin System works, Dr. John Duncan taught me the basics of epigenetics, and Dr. Bryan Ness taught me about research writing and design. I certainly feel blessed to be able to attend a school like PUC whose focus is on the education of its students.

STUDENT RESEARCH & INTERNSHIP

Intern Molly Reeves (2nd from left) and classmates during a recent Conservation Biology fieldtrip to Safari West, a wildlife preserve and conservation center just twenty miles from PUC.

By Molly Reeves, Senior Environmental Studies major

For most people Thursdays simply signify the fifth day of the week, one day separating them from the weekend, but for me Thursdays are the best day of the week. Every Thursday morning at 5:30 am I jump out of bed and pull on the clothes and boots I have laid out the night before for my internship at Safari West, all part the requirements for my Environmental Studies degree. I know what you are thinking, most college students recognize only one 5:30 in the day, and it isn't in the morning! However, when I get to Safari West, I forget that it is early, and that it is so cold that most animals refuse to emerge from their barns.

As I walk down one of the many paths to the bird kitchen where I work I notice that the giraffes aren't out yet, which is not surprising. The two species of giraffe that make up the herd at Safari West, Reticulated and Masi, have a heated barn which they refuse to vacate when the mercury dips.

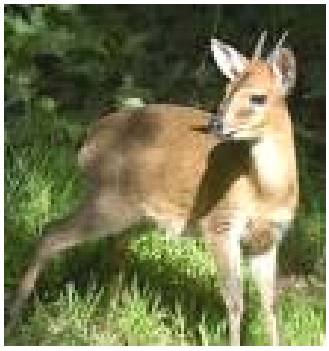
My day in the kitchen starts with soaking eight very large pans of trout and dog food mixture with hot water. Then various other dishes need to be soaked, including, but by no means limited to, monkey biscuits. There are approximately five industrial-sized bags of frozen mixed vegetables that need to be thawed out, and water buckets that need to be filled before the first dish of the day can be picked up.

There are usually five people working in the bird kitchen on Thursday mornings, four who have worked at Safari West for years, and me. The air is full of jokes that other people wouldn't get and smells that most people wouldn't tolerate, but we laugh and ignore it. "Prickers," a hand-raised female Indian Porcupine, lives outside the kitchen and loves oranges, zucchini, carrots and yams. "Harvey," an ornery Vulture, has his own private barn, which he leaves to follow people around the back yard, which can be disconcerting at first.

As the morning rolls on one of the employees asks if I want to help feed birds in the large aviary. Who wouldn't? I grab some gloves (a must for most jobs around Safari West), and the stainless steel bowl full of mice and ground meat. As we walk to the aviary she tells me how to roll the meat into bit-sized balls for the birds, where to stand when I throw the food, which birds to make sure get food and which birds to watch so that they don't get too much.

When no one needs an extra set of hands, I am in the kitchen washing dishes for the 500+ animals that the bird kitchen takes care of, including monkeys, lemurs, porcupines, and tortoises, not to mention all of the birds. When dishes are done I chop carrots, papaya, yams, apples, pears and anything else the animals eat.

It may not sound very glamorous, it isn't always pleasant, and I usually smell when it's over, but it is the best part of my week!



This is a duiker buck (a small type of antelope) and is one of the many wild animals cared for at Safari West.

HELP US TO KEEP RESEARCH OPPORTUNITIES AVAILABLE TO OUR BIOLOGY AND ENVIRONMENTAL STUDIES MAJORS

You can make an online donation by visiting https://www.puc.edu/alumni/give-online and select "Other" under fund priority or make a check out to Pacific Union College and send to the PUC Advancement, One Angwin Ave, Angwin, CA 94508. Be sure to indicate that your donation is for the Biology Student Research Fund. Thank you for your support!

STUDENT RESEARCH & INTERNSHIP

By Dustin Baumbach, Junior Environmental Studies major

The Marine Mammal Center helps all types of seals from the San Francisco Bay area to the Monterey Bay area - helping them recover from vicious shark bites or teaching the babies that come in to the center for the first time how to eat. Sometimes, leaving these injured seals alone to heal by themselves helps the most—usually for the older ones. But most of the time, stepping in and tube feeding them or putting in IVs is best. The Marine Mammal Center is a very important part to marine life in the San Francisco Bay and Monterey Bay areas.

My first Sunday at the center was spent learning the basics and watching how everything works. The most important part of learning the basics on my first day was learning how to board the sea lions to protect ourselves from them. There are many different techniques to boarding, which consists of a big wooden board with handles that you put in front of yourself to fend off the sea lions or seals if they decide to try and bite at you or if you are protecting someone while they are giving medication to a seal. Boarding techniques include cross boarding, which consists of having a person on either side of the seal putting a crossing board behind the animal's head to prevent it from turning its head to bite the person behind it, who is either giving a shot or taking measurements. This technique, and others like it, must be learned correctly for the safety of the sea lion in some cases and most importantly for the safety of the volunteers.

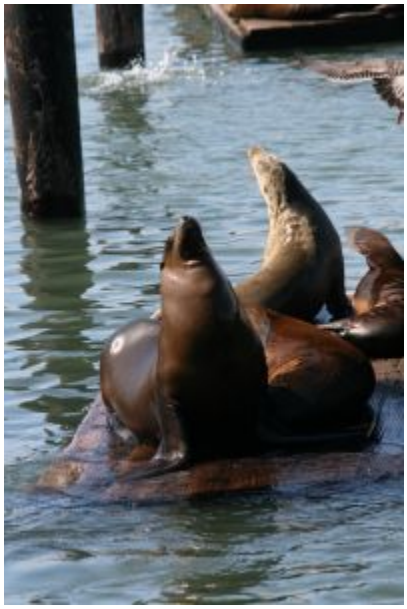
An important part in feeding the seals is preparing their fish meals correctly. Usually in the morning when we arrive there are people in the kitchen getting the fish ready for the seals, getting their medicine fish (medfish) ready and weighing out the portions for each pen. To prepare the medfish, a long metal rod is stuck in the gills of the fish about half way into the body and then the pills are stuck into the hole made. The fish is marked with an "X" and put in a labeled cup so that the staff knows that there is a medfish to be given. This way, the medfish is fed to the seal first so that the medication does not dissolve in the water.

Another method of feeding, when the animal is not feeling well, is to tube feed it. This method involves restraining the animal by having someone sit on top of the animal and hold the flippers down. Next, a tube is put down the animal's throat into its stomach. Special care is taken to insert the tube down the animal's esophagus instead of its windpipe. Once the tube is in the stomach, a big syringe filled with "fish mash" is attached to the end of the tube and food is injected down the tube into the animal's stomach. The same methods are used to put IVs into a seal also, first restraining and then cross boarding the seal to protect the person injecting the seal with vital fluids.

The Marine Mammal Center is very important for pinnipeds up and down the coast of California and has several locations: the Marin Headlands, Pier 39 in San Francisco, and Monterey Bay. This center provides the means for stranded or mortally wounded seals to come and recover and learn the basics of being on their own out in the ocean again. Some recovering or young seals must learn how to compete during feeding time and how to eat fish. Without this center there would be many dying and dead seals along the beaches and in the oceans off the California coast. Providing these services is important and helps preserve seal species of the Pacific Ocean. It has been a good experience working with these animals so far and has provided me with the valuable experience for the world of marine biology.

To learn more about the Marine Mammal Center, please visit http://www.marinemammalcenter.org/

Dustin Baumbach has an internship at the Marine Mammal Center located in the Marin Headlands. In this picture he poses with a furry friend (which is not a marine mammal by the way).



Sea lions at Pier 39 in San Francisco. The Marine Mammal Center cares for sick, injured, and orphaned sea lions (and other pinnipeds) that are found along the California coastline.

ALBION FIELD STATION

The front of the newly renovated Laboratory Building at the Albion Field Station. Photo by Gilbert Muth.

A renewal of Albion Field Station continues under the direction of Professor Emeritus Gilbert Muth and Larry Provonsha. Most recently the lab building was renovated and a beautiful deck constructed. The lab windows now look out to the estuary as the old boat barn has been demolished.

As is tradition, current and retired faculty of the Biology, Chemistry, Computer Science, Math, and Physics departments at PUC recently spent a weekend at Albion together. This is a welcome retreat for the faculty and their families and gives us an opportunity to spend time getting to know each other better. This year we had a rich discussion of topics pertinent to Adventist education in the sciences.

Remember that Albion isn't just for groups—it is the perfect destination for a family excursion or an individual getaway. Make your reservation for a single cabin, multiple cabins, or the entire camp by contacting Camp Manager Wil Cook at albion@puc.edu or calling 707-937-5440. Please go to http://www.puc.edu/puc-life/albion/home for additional information.

PUC BIOLOGY CLUB UPDATE

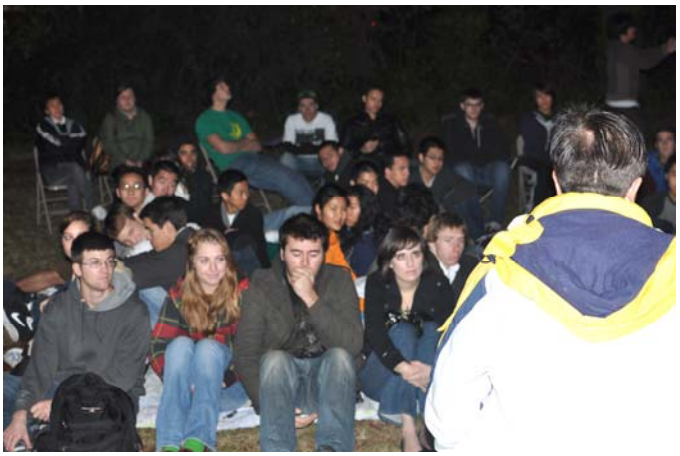
This is the third year of the modern version of the Biology Club. More than fifty students across campus are members of this club. The club officers are committed to planning activities that highlight nature and enjoyment of the living world.

In mid-October, a group of 30 students made their way to Goat Rock. The weather at the beach was beautiful and warmer than at PUC. Students and faculty sponsors enjoyed good food, songs and stories around the campfire. This was a great way to start the Sabbath.

Just recently more than sixty students gathered together for a winter "picnic" and barbecue. A whale-watching trip is planned for late January and a camping trip to Albion Field Station is planned for April.

Biology Club officers at Goat Rock during an October pre-vespers. From left to right: Jordan Higa, Esther Tak, Aimee Wyrick (sponsor), Rachelle Kim, Peter Han, and Dustin Baumbach. Not pictured: Lawryn Ask. Photo by Joe Kim.

Biology Club on the beach at Goat Rock. Photo by Joe Kim.



Biology Club winter "picnic" pre-vespers with a devotional given by Brian Wong. Photo by Joe Kim.

BIOLOGY FACULTY RESEARCH and SCHOLARSHIP

Biology faculty continue to be involved in active research and in publishing and presenting in their fields of expertise.

Duncan, J. Contributed to the analysis of the pathology report in Ostwald, P. and Ostwald, L.D. 2010. Schumann The Inner Voices of a Musical Genius. Northeastern University Press, 416 pp.

Frost, M. D., **F. E. Hayes**, and A. M. Haynes Sutton. 2009. Saint Vincent, the Grenadines, and Grenada. Pp. 187-194 in An Inventory of Breeding Seabirds of the Caribbean (P. E. Bradley and R. L. Norton, eds.). University Press of Florida, Gainesville, FL.

Hayes, F. E., and S. Bodnar. 2009. Trinidad and Tobago. Pp. 195-201 in An Inventory of Breeding Seabirds of the Caribbean (P. E. Bradley and R. L. Norton, eds.). University Press of Florida, Gainesville, FL.

Hayes, F. E., B. Sanasie, and I. Samad. 2009. Status and conservation of the critically endangered Trinidad Piping-Guan *Aburria pipile*. Endangered Species Research 7:77-84.

Hayes, F. E., C.L. Shameerudeen, B. Sanasie, B. D. Hayes, C. L. Ramjohn, and F. B. Lucas. 2009. Ecology and behaviour of the critically endangered Trinidad Piping-Guan *Aburria pipile*. Endangered Species Research 6:223-229.

Ness, B. 2009. Creation, evolution, and Adventist higher education. Spectrum 37(4): 44-50.

Nguyen, D L., Devadhason, R. R. and **Wong, B.Y.Y**. (2008) Dosage-dependent regulation of caspase 8 activation in LNCaP and DU-145 human prostate cancer cell lines by the Chinese medicinal herb *Scutellarian barbata*, Proceedings of International Conference of Frontiers in Cancer Prevention of the American Association of Cancer Research, 2008, Nov 16-19, Abstract #A39.

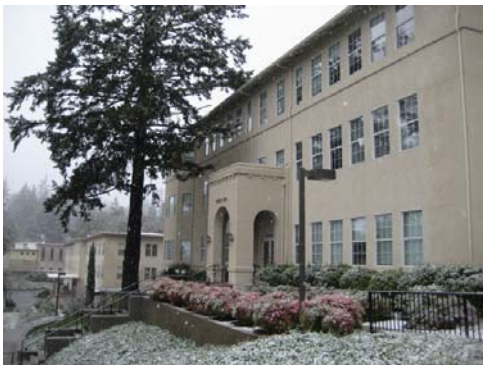
Nguyen, D.L., **Wong, B.Y.Y.,** Cabrera, I. B. and Hausted, R. P. (2008) Synergistic chemopreventive effect of the Chinese medicinal herbs *Scutellaria barbata* and Oldenlandia *diffusa* on tumor progression and development in TRAMP mice and the induction of Caspase 9 in LNCaP cells, Proceedings of the American Association of Cancer Research General Annual Meeting, 2008, April 14-16.

Wiley, J. W., and **F. E. Hayes**. 2009. A bibliography of seabirds in the Caribbean region. Pp. 294-334 in An Inventory of Breeding Seabirds of the Caribbean (P. E. Bradley and R. L. Norton, eds.). University Press of Florida, Gainesville, FL.

Wong, B.Y.Y., Nguyen, D. L. , Lin. T., Wong, H. L., Cavalcante, A., Greenberg, N. M., Hausted , R. P. and Zheng, J. (2009) . Chinese Medicinal Herb *Scutellaria barbata* Modulates Apoptosis and Cell Survival in Murine and Human Prostate Cancer Cells and Tumor Development in TRAMP Mice, European Journal of Cancer Prevention, 18 (4): 331-341.

Wong, B.Y.Y., Lucas Y. Kim, L.Y., Kim, B.Y., Jung, J., Nishikawa, C.Y., Alyssa K. Zima, A.K. and Hausted, R.P. (2010) Inhibition of Azoxymethane-induced aberrant crypt foci in C57BL/6 mice by the Chinese medicinal herb *Scutellaria barbata,* Proceedings of the American Association of Cancer Research 101st General Annual Meeting, 2010, April 17-21.

Wyrick, A.C. 2009. Using surveys to start the conversation on science and origins. Geoscience Research Institute 2nd Conference on Teaching Origins. Colorado Springs, CO, 7-10 August 2009.



Clark Hall is shown here on a recent January morning. Heavy snow blanketed the campus in the morning but melted away by early afternoon.

Please visit our website:
http://www.puc.edu/academics/departments/biology
to view this newsletter in color and to see more pictures of current biology students and faculty.

Issue 7, Winter 2010 newsletter edited by Aimee Wyrick

DROP US A LINE, GIVE US A CALL!

We'd love to hear from you. Tell us what you are doing now. What memories do you have of PUC and the Biology Department? We'd love to share your stories with our current students and other alumni in our next newsletter. You can mail your updates to 1 Angwin Avenue, Angwin, CA 94508 or email to awyrick@puc.edu.

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