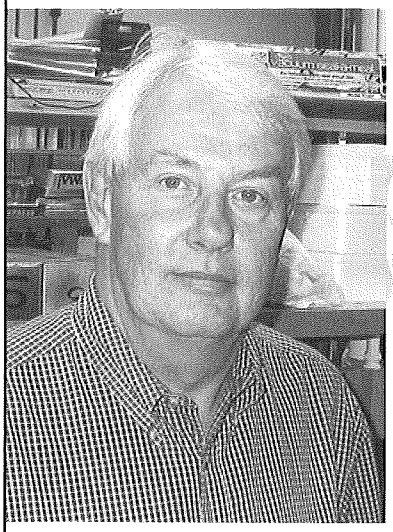
DEPARTMENT OF

Biology

2008 NEWSLETTER

UNIVERSITY OF OREGON



Welcome to the second edition of the Department of Biology's newsletter. As with the inaugural edition of the newsletter, we've tried to provide a snapshot of the department and its activities by presenting articles that focus on undergraduates, graduate students, and faculty members. We hope that you'll find some news items and stories that mesh with your interests. As I write this, the national and international economies are reeling and headed for recession, if they are not already there. The state's economy has been surprisingly resilient but it will surely follow into a recession. Despite this major downturn in the economy, all is not bleak for biology at the University of Oregon. Major donations from Lorry Lokey and from the Lewis family, totaling well over $60 million, has set in motion planning for a new science building that will house some of the biology faculty; in particular, faculty members associated with the Brain, Biology, and Machine Initiative. We hope that a major refurbishment of undergraduate teaching labs will also be a part of this overall project. The next few years promise to be interesting as we watch our plans mature and come to fruition.

George Sprague

George Sprague, Department Head

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BIOLOGY NEWS

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In the News

UO-led project leads to the creation of two nanotech-driven tools for biologists and neuroscientists

UO biologist and neuroscientist **Shawn Lockery** (Institute of Neuroscience) led the development of two microfluidic devices that improve upon older cumbersome tools used to study *C. elegans.*

The standard laboratory substrate commonly used in *C. elegans* research, a planar agarose surface, is incompatible with high-resolution optophysiology experiments. A new class of microfluidic devices—agarose-free, micron-scale chambers and channels—mimic a moist-soil matrix and facilitates rapid delivery of fluid-borne stimuli. The artificial-soil device will help to study how brains generally process sensory information as well as high-through-put screening of new drugs for their biological effects. Such research could lead to new treatments for some 2 billion people infected annually by parasitic nematodes, as well as new tools to reduce nematode-caused losses in world agriculture. The new devices are likely to accelerate studies of the neuronal basis of behavior in *C. elegans.*

Jan Hodder chosen to lead new ocean education center

Jan Hodder (Oregon Institute of Marine Biology) has been named to head the Pacific Partnerships Center for Ocean Science Education Excellence (COSEE), the newest regional collaborative center dedicated to ocean education and funded by the National Science Foundation.

Other members of the COSEE Pacific Partnerships are Oregon State University's Hatfield Marine Science Center, the Humboldt

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Lokey Laboratories facility offers nanoscience tools

The new UO Lorry I. Lokey Laboratories facility has been described in campus and local newspapers and broadcast media multiple times this year, from the announcement of the benefactor's generous donation to the initial blueprints and the groundbreaking and ribbon-cutting ceremonies. This signature research center was made possible with a multimillion-dollar gift from philanthropist Lorry I. Lokey, founder of Business Wire. The new facility is designed to support graduate education, enhance the university's ability to recruit and retain world-class faculty members in the sciences, and educate the next generation of scientists. The Lorry I. Lokey Laboratories facility is the latest addition to the UO's Lorry I. Lokey Science Complex. The recently announced $65 million Robert and Beverly Lewis Integrative Science Building, expected to open by 2012, will include new laboratory and classroom space in addition to housing expanded campus fMRI instrumentation and other Brain, Biology, and Machine Initiative facilities.

John Donovan, director of the Microanalytical Facility in the Lokey Laboratories, assists students on the Cameca SX100 electron microprobe for high-accuracy elemental analysis.

Within these labs, students will have access to technologically advanced instruments including more than twenty ultrasensitive instruments for research in chemistry, nanoscience, materials science, bioscience, geology, and optics. In fact, the value of the building's highly specialized instruments exceeds the cost of constructing the $16 million facility.

The new FEI Titan transmission electron microscope (TEM) has a specified resolution of 0.9 angstroms—or less than 9/100ths of a nanometer, so it can actually image atom-scale contrast. It is actually the highest-resolution commercially made microscope on the market today. The TEM is a powerful tool for seeing cellular detail, so there certainly will be many uses for people in cellular biology. This state-of-the-art, $4 million instrument replaces the old TEM, which is in the basement of Huestis Hall.

This fall will see the arrival of a dual-beam focused ion beam (FIB), which is a high-resolution (better than 1 nm) scanning electron microscope containing an ion-beam source that can be used to remove or deposit material at the nanoscale. The FIB is to be located in the clean area of the nanofabrication lab, but all sorts of materials can be used on it. The nanofabrication facility also contains a high-resolution Zeiss scanning electron microscope for imaging nanoparticles, and which has electron-beam lithography capability for using the instrument as a writing implement at nanoscales.

The Microanalytical Facility features the FEI Quanta scanning electron microscope, which uses a focused beam of electrons to scan a specimen and produce images that determine the size, shape, and crystal orientation of various materials. It can provide imaging resolution of objects as small as three or four nanometers, roughly the diameter of human DNA, and allows the user to look at normal conductive samples. It also has a low-pressure mode that allows the viewer to look at nonconductive and uncoated materials. It even has an environmental mode that allows the viewer to see samples that are above the partial pressure of water. In other words, they can actually be wet. John Donovan, director of the CAMCOR (Center for Advanced Materials Characterization in Oregon) Microanalytical Facility at the UO, has done some imaging of hydrogen-releasing bacteria for use in possible biological fuel cells for researchers at OSU.

One of the advanced instruments in the bio-optics portion of the facility is the Bio-Rad confocal microscope, which uses lasers to scan specimens. It filters out collected light that is out of focus, so image resolution is very high. While primarily supporting biological research, the equipment here includes a number of microscopes plus computer workstations for data analysis and processing of microscope images and video editing.

The Surface Analytical Facility is home to the ION-TOF time-of-flight secondary ion mass spectrometer (TOF-SIMS), which shoots a pulsed beam of ions at a surface and knocks off atoms and molecules. These atoms and molecules then travel to a collector and, based on their time of travel, the TOF-SIMS can determine their mass, the key to revealing the elemental composition of the original surface.

Understanding surfaces is important for the development of new materials, quality control in manufacturing, and research into the behavior of nanoparticles.

The Lokey Laboratories facility has a full-time staff to train students on the instruments, which is fairly unique even for major research universities. Most campuses around the country do not have such on-site facilities. Having all this equipment under one roof, available to researchers from a variety of scientific disciplines, is intended to foster collaboration and spur scientific advances. Sharing this phenomenally expensive equipment is not only practical (in that it cuts costs) but also productive, because it enables more—and more innovative—research. In addition, there is an educational component, providing workshops and training in the use of the instruments. The labs in this facility are open to all science students at the University of Oregon.

SPUR Scholars Return to UO for Graduate School

The University of Oregon Summer Program for Undergraduate Research (SPUR) offers fellowship opportunities for undergraduate students to participate in ongoing research in UO life sciences laboratories. Three SPUR scholars have returned to the UO to enter the Department of Biology graduate program.

Clayton Merz (SPUR 2007) graduated from the New Mexico Institute of Mining and Technology last spring and has joined the Center for Ecology and Evolutionary Biology (CEEB) as a master's student. Clayton's SPUR research was done in Patrick Phillips' lab.

Omer Bayraktar (SPUR 2006) is a graduate of the Middle East Technical University in Turkey. Omer worked in Alice Barkan's lab during his SPUR summer and returns this year to begin his Ph.D. program with the Institute of Molecular Biology (IMB).

Michael Kyweriga (SPUR 2006) completed his SPUR research with Paul Dassonville (psychology). Michael entered the department's Ph.D. program in 2007 and is now working on his graduate research in the lab of Michael Wehr (neuroscience-psychology).

Helen Tauc (UO senior) will be graduating spring 2009 with her undergraduate degree in biology. She served as SPUR student activity coordinator for two summers. Helen did her research in Andy Berglund's lab (SPUR 2006) and Chris Doe's lab (SPUR 2008).

There were thirty-one 2008 SPUR scholars; twenty came from other universities and eleven were UO undergraduates.

Seated in front, left to right: Clayton Merz (CEEB), Omer Bayraktar (IMB), and Michael Kyweriga (ION). Behind them: Peter O'Day, SPUR director, and Helen Tauc, UO senior, and Clark Honors College student.

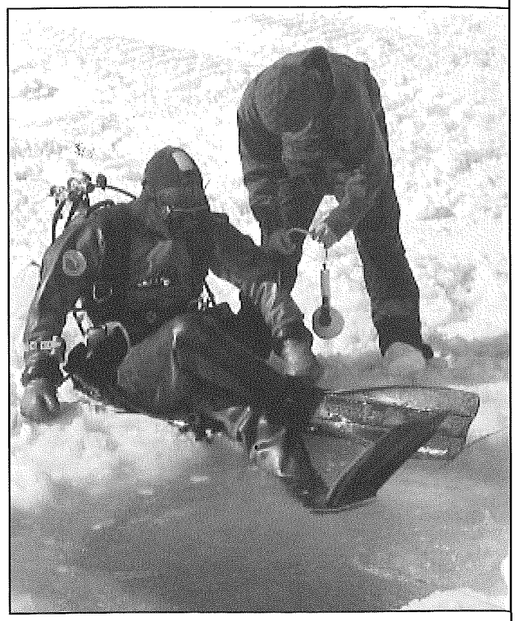
SPUR is an intense summer research experience that includes faculty seminars, field trips, and professional development workshops in addition to full time research. The research projects are done under the direction of primary instructors as well as mentoring graduate students, postdocs, and faculty members.

For more information on the Summer Program for Undergraduate Research, contact the SPUR administrative coordinator, SPUR@uoneuro.uoregon.edu, or visit the SPUR website, biology.uoregon.edu/spur.

GRADUATE SPOTLIGHT—Paul Cziko

Antarctic Research

I had plans for a quiet summer of recuperation after finishing my grueling first year in the Ph.D. program at the Center for Ecology and Evolutionary Biology (CEEB). In this regard I am not so lucky—the pace of research here at Palmer Station (Antarctica) has been steady and strong over the past six weeks, and my hours in the lab drag on long after the four o'clock sunsets. Yet as icebergs drift by outside my window and I peer into tanks filled with an amazing diversity of regional fish and invertebrates, I'm reminded of just how fortunate I am. I'm in Antarctica, collecting samples for a project that will likely turn out to be a large portion of my dissertation research.



Paul prepares for a dive (and some underwater brainstorming) in Antarctica.

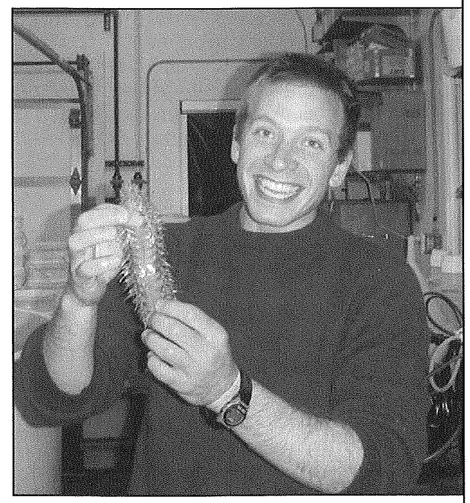
After my undergraduate degrees (biology honors and biochemistry) at the University of Illinois at Urbana-Champaign, I traveled to Antarctica for a six-month stay to work on projects related to fish antifreeze proteins. In continuing work at McMurdo Station that I had begun as an undergraduate, I strengthened my appreciation for polar biology, and began to understand how studying evolution and adaptation at the ends of the Earth can provide astonishing insights into biological systems worldwide. Evolutionary processes that unfold along the border of impenetrable physical and environmental barriers, such as at the freezing point of seawater, can make the critical, limiting factors of adaptation more visible, and more tangible, than they are in temperate regions, and this intrigued me.

When it was time to look for graduate school programs, Oregon was an obvious choice for me. What I wanted was a relatively small department where interactions and collaboration among colleagues were commonplace, an emphasis on the study of evolution as the process that unifies biology, and access to a marine lab. I certainly experienced some initial trepidation about attending a university where science and engineering aren't the academic mainstays, and I had hoped to work on polar organisms. But together, the Department of Biology, CEEB, and OIMB met my most important criteria, and I was right to choose to be here. I had learned a great deal and enjoyed myself as an undergraduate, but I always felt that I was missing something, some vital aspect of my education. In CEEB, I quickly discovered what that was.

Rotating through the labs of Joe Thornton, Bill Cresko, and Craig Young this past year, I found myself in foreign and exciting territory. For the first time, I was talking about science and thinking about topics and ideas as part of a group. Lab meetings and journal clubs met routinely and frequently. Evolutionary biologists, ecologists, neuroscientists, molecular biologists, and even computer scientists came together to infuse discussions with ideas from their respective fields as they apply to broader questions in biology. Communicating in science is one of the most important skills to master as a graduate student, and I feel that the cross-disciplinary emphasis on it here is well placed.

Unfortunately, no faculty member in CEEB presently has a polar biology background, and my icy dreams might have been put on hold if not for a welcome twist of fate. This spring I was awarded three years of support through a National Science Foundation Graduate Research Fellowship to study the evolution and ecology of a novel protein in Antarctic invertebrates that may facilitate their survival in the frigid Southern Ocean. Upon accepting the fellowship, I approached CEEB faculty member Joe Thornton about pursuing this project in his lab for my dissertation research. Although Joe studies the evolution of nuclear hormone receptor proteins, he was enthusiastic. Indeed, one of CEEB's core philosophies is that by studying the mechanics of evolution itself, scientists can arrive at the most comprehensive understanding of life as we know it; the model, whether receptors or invertebrates, should be chosen for its ability to shed light on this one unifying process.

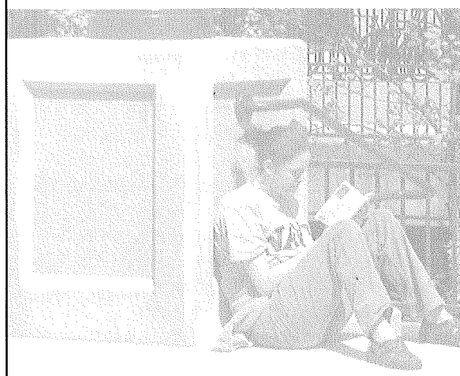
Though many hurdles remain for me to overcome in order to pursue polar biology studies at the UO, I am excited about my prospects. In this first year I've made huge steps in the direction that I want to be heading: I've become accustomed to life and research at sea through two trips to the Bahamas with faculty members Michelle Wood and Craig Young to study marine invertebrate larvae and cyanobacteria, I've spent a term familiarizing myself with the marine life and the community at OIMB, and with a generous offer from my previous advisers, I've made the trip back to Antarctica to make inroads on my project. During this first year at CEEB, my appreciation for the diversity of life on this planet has grown enormously, and concurrently, my scheme for understanding it has shifted in the right direction. Needless to say, I'm delighted to be studying evolution at the University of Oregon.



Probably the largest polynoid polychaete worm I've ever seen.

For more information on the U.S. Antarctic program, visit www.usap.gov.

Paul's blog and photos from his Antarctica trip are at realcoldfish.wordpress.com.



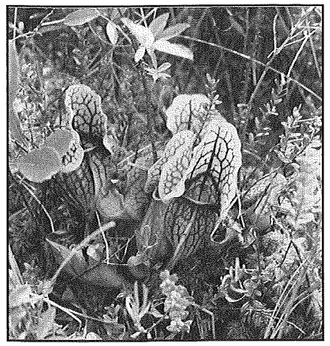
Share Your News with Your Classmates

Share your UO experiences with your classmates or just tell us what you are doing these days. We will try to publish it in the next issue of the Department of Biology Newsletter. Send us your reflections and news items: e-mail to newsletter@biology.uoregon.edu or send a letter to Newsletter, Department of Biology, 1210 University of Oregon, Eugene, OR 97403-1210.

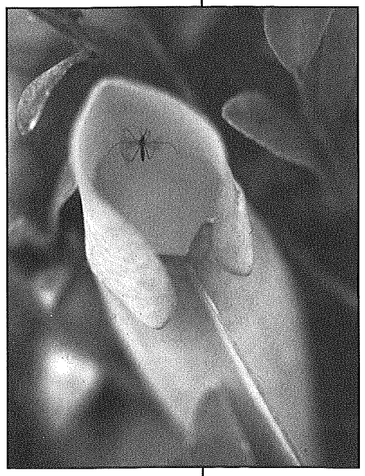
"Who, me? Become a research scientist? Really?"

Inside the Bradshaw-Holzapfel Lab

It is hard to miss the long trail of students trudging toward the Bradshaw-Holzapfel Lab every Monday morning for the weekly lab meeting. It is, after all, not yet 8:00 a.m. The somewhat raucous music coming through the lab door means that there are already students hard at work. "What can I say?" remarks graduate student Kevin Emerson. "We have lab meetings at 8:00 a.m. because there are so many of us that this is the only time we can all get together as a group."



So, what is the attraction of a somewhat crowded laboratory built in a rather drab corner suite next to the recycle bins in Pacific Hall? In truth, too many things to list here. This is the lab that was overrun by media last year from *The New Yorker, The Boston Globe, The London Times*, the BBC, NPR, and many others as the news was released of their groundbreaking research showing that animal populations had changed genetically in as few as five years as a result of rapid climate warming. As Bill Bradshaw likes to say, "People hate to have something potentially messing with their genes and rapid climate change can do just that." This is the lab that, at about the same time, was selected by the National Science Foundation (NSF) as one of ten from among all funded research programs at NSF—from mathematics to aeronautics and space science—that best represent the NSF goal to "foster research that will advance the frontiers of knowledge, emphasizing areas of greatest opportunity and potential benefit and establishing the nation as a global leader in fundamental and transformational science and engineering." A lot is going on in this lab.



Pitcher plant and mosquito

Students come to 305 Pacific Hall because of the exacting and socially relevant research environment, and also because William Bradshaw and Christina Holzapfel are known to offer a unique testing ground for undergraduates who think that they may want a career in biology. Research science can be a somewhat isolating experience, and requires long hours of work at the bench, in data analysis, and in writing. The right time for a student to experience the challenge of research is as a young undergraduate, so that they have ample time to decide if the lifestyle is a good fit for them. As Chris says, "Research at a high level consumes one's life. It is the most exciting endeavor imaginable to develop new knowledge, but you do find yourself thinking about 'the next experiment' pretty much 24-7."

New undergraduates entering the lab first learn about basic mosquito care and maintenance. Depending on their interests, they move into their own individual research projects, often resulting in completion of an undergraduate thesis and, in some cases, publication in a refereed journal. Other students act as paid participants in some aspect of one of the major funded research projects, where they may take on responsibility comparable to what they would experience in graduate school. Students are expected to attend lab meetings, participate in discussions, and meet regularly with graduate student or postdoctoral mentors. Each learns to describe clearly the purpose of their work and why it is important in a broader context. Undergraduates are monitored through each step of their development, both as young scientists and, of equal importance, as individuals who often need help and support on a personal level.

After a year or so of training, a student is either captivated by research or realizes that their career lies elsewhere—in medical school, law school, journalism, business, or sometimes in the forest service or wildlife management. Whatever the student's choice, the approach used by this lab is a win-win for all: students ill-equipped for a research career choose another profession and graduate schools do not waste precious resources training a student with little future prospect in research.

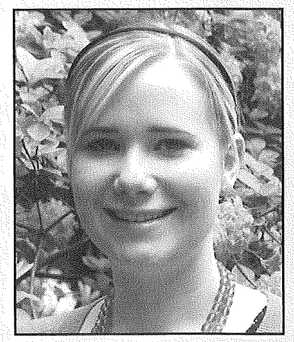
Hundreds of undergraduates have passed through this lab on the way to their chosen careers. About half have gone on to graduate schools at other prominent research institutions and are now themselves professors. An early undergraduate student mentored by Bradshaw and Holzapfel went on to graduate school at Cambridge University and now holds an endowed chair at Vanderbilt University. Other recent undergraduates are in graduate school at Yale, Brown, Stanford, and Notre Dame.

Regardless of an undergraduate's ultimate career, no one leaves this lab without having become an informed citizen who understands the importance of research funding and the relevance of basic research, which has yielded so many contributions to each and every one of us.

For more information, visit the Bradshaw-Holzapfel Lab website, www.uoregon.edu/~mosquito.

UNDERGRADUATE SPOTLIGHT ▪ Kristina Urbanski

I have been intimately connected to the field of science for as long as I can remember. My father, a neuroscientist, encouraged my scientific learning from a very early age. In fact, I have a collection of what I am sure are unique and unusual childhood memories—my mother scolding my father for pointing out the internal organs of dead squirrels and birds, dissecting dead hamsters in our laundry room, and assisting in a tumor removal operation for Robin, my little brother's pet rat. Needless to say, my interest in science was sparked early on. Yet years later, when I entered the University of Oregon, I still didn't know how to translate my interest in science into a career choice.



Despite the many wonderful opportunities for undergraduate research at the UO, I knew scientific research wasn't my calling but was unsure about how to proceed from there. Then one day in my sophomore year, Mark Carrier, my Biology 212 professor, approached me about being a biology peer tutor. Initially, I had some reservations about being a tutor. I was concerned about the amount of work involved, unsure of my own abilities to lead lab sections, and nervous about working with students, a number of whom were actually older than me. I wasn't really interested in a career in science education either, but I was flattered by the invitation. Deciding that it might be an interesting opportunity, I accepted.

Looking back, I can honestly say that my participation in the biology peer tutoring program is one of the most rewarding educational experiences I have had at the UO. As a tutor for Biology 212, I had many duties. I attended lectures, graded lab reports and homework, helped teach weekly lab sections, and held tutoring hours. It is during lab sections and tutoring hours that I have had some of my most wonderful experiences. I learned that I love the mission of taking confusing and abstract scientific concepts and putting them into terms that others can understand. As a tutor, I was constantly forced to expand my communication skills, rewording and rethinking my explanations in countless ways. I learned to look forward to this challenge and even become a bit excited when students attended my tutoring hours. It is through these teaching experiences that I learned I truly enjoy working with people and that helping them is one of my strengths. In fact, it is these important self-discoveries that later helped to reinforce my decision to attend pharmacy school.

As a tutor, you learn very quickly to be patient because you deal with many different types of people. Some people are friendly and eager to learn, while others can be angry or easily frustrated. It is a key aspect of any career in the health field that one is able to handle themselves positively in any of these situations. In addition, helping others has allowed me to improve my communication skills, while at the same time greatly deepening my own understanding of certain scientific concepts.

My experience in this program has been so enjoyable that I have managed to make room in my busy schedule for tutoring every winter and spring term for the past three years. Along with all of the fun times and great friends, I know that the patience and confidence I have gained from my experience as a biology peer tutor at the UO will help me greatly in the future. I feel fortunate that I attended a school that recognizes the mutual benefits of encouraging peer education, for it has given me an invaluable experience.

In the News continued from page 1

State University Marine Laboratory in California, the Kewalo Marine Laboratory at the University of Hawaii, and Western Washington University's Shannon Point Marine Center. Scientists at each lab will partner with regional community colleges and informal science educational projects to promote ocean education.

The centers are designed to integrate ocean-science research into delivery of high-quality education programs and to promote a deeper public understanding of the oceans and their influence on the quality of life and national prosperity. Each COSEE partnership is intended to foster interactions among ocean research institutions, formal education organizations, and informal education providers.

Shawn Lockery selected as Guggenheim Fellow for 2008

Shawn Lockery (Institute of Neuroscience) was one of two recipients of the Guggenheim Fellowship in the neuroscience field in the natural sciences. His research has led to a new imaging method, one that allows for further research that he plans to pursue next academic year in the laboratory of one of the founders of microfluidics at Harvard University. While on sabbatical, Lockery will work on a new device for studying the relationship between neuronal activity and behavior in freely moving animals. "This model will, in turn, show the way forward for comprehensive nervous system models in higher organisms," Lockery said.

Guggenheim Fellowships are American grants that have been awarded annually since 1925 by the John Simon Guggenheim Memorial Foundation to those "who have demonstrated exceptional capacity for productive scholarship or exceptional creative ability in the arts."

Hui Zong selected as 2008 Pew Scholar in the biomedical sciences

Pew Scholarship recipient **Hui Zong** (Institute of Molecular Biology) will receive $240,000 over four years for his research exploring the very earliest stages of tumor formation, a period of cancer initiation that has been difficult to study. Zong, who joined the UO faculty in 2006, was the only award winner from the Northwest. His work could lead to new strategies for early detection and treatment of cancerous tumors.

UO chooses first projects funded by new tax-credit program

The University of Oregon announced the first projects to receive funding through private gifts to the University Venture Development Fund, a state income tax credit program designed to help move research discoveries to the marketplace.

One of the projects is a prototype for a new device that may lead to technologies for diagnosing the hearing capabilities of patients too young or too ill to indicate awareness of sounds. Created by **Terry Takahashi** (Institute of Neuroscience), the hearing-evaluation device will not require a patient's ability to answer questions. The concept developed from Takahashi's work with barn owls, which led to the discovery that the pupils of the eyes dilate reliably in response to sounds. Recently completed trials found that the pupilary dilation response is as reliable as conventional ways of testing human hearing.

John Postlethwait to pursue Fanconi anemia work in Germany

John Postlethwait (Institute of Neuroscience) will spend 2009 in Germany studying molecular mechanisms involved in Fanconi anemia under a Humboldt Research Award.

The prestigious Humboldt award is presented to as many as 100 academic scientists each year by the Alexander von Humboldt Foundation, located in Bonn, Germany. It recognizes a researcher whose work has had a significant impact on his or her discipline. Award winners are invited to spend as much as one year on a long-term research project with specialist colleagues at a research institution in Germany.

Beginning in January 2009, Postlethwait will collaborate with professors Holger Hoehn and Manfred Schartl at the University of Wurzburg. Hoehn and Schartl nominated Postlethwait for the honor.

Two UO graduate students win NSF Graduate Research Fellowships

Paul Cziko (Center for Ecology and Evolutionary Biology) and **Mike Miller** (Institute of Molecular Biology) have been awarded a prestigious National Science Foundation Graduate Research Fellowship. This highly competitive award provides three years of support for outstanding graduate students whom the NSF expects to contribute significantly to research, teaching, and innovation in science and engineering. The program recognizes and supports outstanding graduate students in the relevant science, technology, engineering, and mathematics disciplines who are pursuing research-based M.S. and Ph.D. degrees. NSF fellows are expected to become knowledge experts. These individuals will be crucial to maintaining and advancing the nation's technological infrastructure and national security as well as contributing to the economic well-being of society.

Paul proposed to focus his graduate work on invertebrate antifreeze molecules (special proteins that allow adaptation to life in extremely cold water) as a model for adaptive and convergent evolution.

Mike was one of eight students nationwide to receive the fellowship in the field of developmental biology. Mike's graduate work will focus on using fruit fly embryogenesis as a model to better understand the transcriptional regulatory networks that underlie development.

Richard Castenholz honored

Professor Emeritus **Richard Castenholz** (Center for Ecology and Evolutionary Biology) was recognized for "seminal contributions to research in the geothermal systems of Yellowstone National Park" by the Research Coordination Network for geothermal biology and geochemistry at Yellowstone.

Throughout the last twenty-five years, Castenholz has been involved in unraveling the confusion in cyanobacterial taxonomy and classification. He has established a culture collection of cyanobacteria from many locations and habitats, including a large number of isolates from hot springs (alkaline and acidic) over much of the globe, from hypersaline waters, and from polar freshwater habitats. The collection, named the Culture Collection of Microorganisms from Extreme Environments, now contains over 1,200 strains.

Frank Stahl retires

In the March issue of *Genetics*, two papers appeared that reflect the contributions of an extraordinary group of undergraduates to the Stahl Lab's efforts to understand genetic recombination in yeast.

The research, conducted by Tony Getz, Stephen Banse, Allison Banse, and Grace Wang, is described in "Reduced Mismatch Repair of Heteroduplexes Reveals 'Non'-Interfering Crossing Over in Wild-Type *Saccharomyces cerevisiae* (Getz et al., 2008). This paper establishes the existence of two phases of crossing over in wild-type yeast, only one of which manifests classical crossover interference.

The historical impact of the students' work is described in a perspective in the same issue by **Frank Stahl** and Jette Foss in "But See Kitani" (*Genetics*, Vol. 178, March 2008, 1141–45). During the conduct of the research, Stahl's NIH grant failed to get renewal funding and he decided to close his laboratory. The fate of the seven ongoing projects was uncertain until the students huddled (without Stahl) and decided which projects had to be triaged and which could be completed in the remaining year.

On the strength of their demonstrated abilities as experimentalists and strategists, the four went on to careers of their own choosing. Grace is an M.D.-Ph.D. candidate at Johns Hopkins, Stephen and Allison are Ph.D. students at Harvard's Department of Molecular and Cellular Biology, and Tony is managing a biotech laboratory in Tanzania.

Stahl joined the faculty of the Institute of Molecular Biology in 1959 and from 1985 was also a research professor at the American Cancer Society. Notable among his later work is his extensive research on the bacteriophage, a virus that infects bacteria, and its genetic recombination. The recipient of numerous honors, Stahl was awarded two Guggenheim Fellowships in 1975 and 1985.

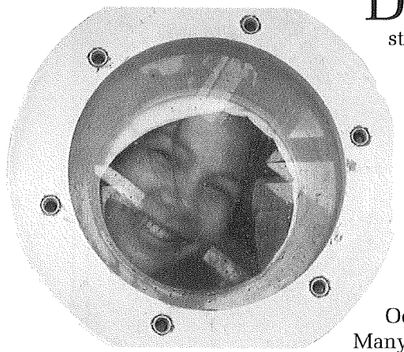
Maya Wolf (graduate student, Oregon Institute of Marine Biology) just returned from the annual meeting of the American Society of Parasitologists, where she received one of three meritorious student awards for the paper she presented on specialized parasitic copepods living in nudibranchs. Maya's talk was entitled "Castrator or Cradle Robber? The Effects of a Parasitic Copepod on Its Nudibranch Host."

Xinjun He (graduate student, Institute of Neuroscience) won the International Understanding Award, given to international students who help to improve the understanding of different cultures on campus. Xinjun was vice president of the Chinese Students and Scholars Association last year.

Liz Perry (graduate student, Center for Ecology and Evolutionary Biology) won the Clarence and Lucille Dunbar Scholarship. Awarded by the UO College of Arts and Sciences, this scholarship recognizes high-achieving undergraduate and graduate students in the areas of biology, chemistry, computer and information sciences, human physiology, geological sciences, mathematics, physics, and psychology.

Liz was also recognized at the NSF's Research Coordination Network conference at Montana State University, where she received the runner-up prize for best oral presentation by a graduate student. Liz's talk, "The Diversity of the Thermo-acidophilic Cyanidiales in Yellowstone, Japan, New Zealand, Iceland, and the Philippines," was based on her fall rotation project in Richard Castenholz's lab.

High-Pressure Learning:



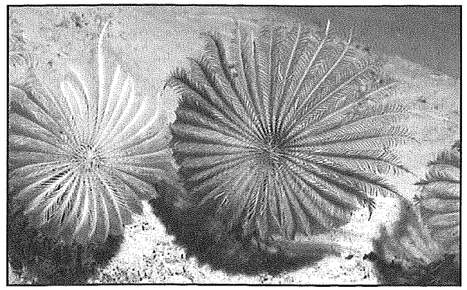
Sarah Matthews in sub

During spring term of 2008, professors Craig Young, Michelle Wood and Richard Emlet sailed an oceanographic vessel full of students and colleagues from Florida to the Northern Bahamas. In the Tongue of the Ocean, a deep oceanic trench separating the islands of Andros and New Providence, and surrounding regions, they conducted twelve days of research on the distribution of cyanobacteria and the feeding biology and development of deep-sea invertebrate larvae. The cruise, one of three in a collaborative project sponsored by the National Science Foundation, afforded a unique educational opportunity for twelve graduate students from the UO department of biology. Students assisted with research while receiving credits for a field-based course in deep-sea biology taught by Craig Young (OIMB), Paul Tyler (National Oceanography Centre, Southampton, UK), and other guest lecturers. Many of the lectures were delivered at night on the deck of the ship as it drifted under the tropical stars. Teams of students conducted original research projects with deep-sea animals and each student made one or more dives in a research submersible. They also learned to use oceanographic sampling gear (conductivity-temperature-depth [CTD] and multiple opening-closing net environmental sensing system instruments) for collecting microbes, plankton, and environmental data from depths as great as 4,000 meters. Travel funds for the students came from a generous grant provided by Oregon Sea Grant at OSU.

The deep-sea course provided not only real-world research experiences for graduate students, but also vicarious online adventures for elementary school students back in Oregon. Most of the graduate students on the cruise teach elementary school science through the NSF-funded GK–12 program based at OIMB. While at sea, these teacher-students maintained contact with their pupils through daily blogs uplinked from the ship by satellite. Graduate students fielded questions from classes in Oregon while sharing the excitement of submersible dives, snorkeling expeditions to coral reefs, and the discovery of several animals new to science. Cruise logs may be viewed on the "OIMB Kids" website, **oimbkids.com/site**, designed by UO alumnus Andrew Young, web designer for the Hillsboro School District.

Two submersible dives were made each day in a Johnson Sea-Link submersible, generally with one faculty member and one student on each dive, accompanied by two pilots. Faculty members normally rode in the five-inch-thick Plexiglas sphere that provides an expansive view; most students visited the sea floor in a separate aluminum compartment with small portholes. However, one student, Ezzy Cooper, won a shipboard lottery drawing for the final front-seat dive.

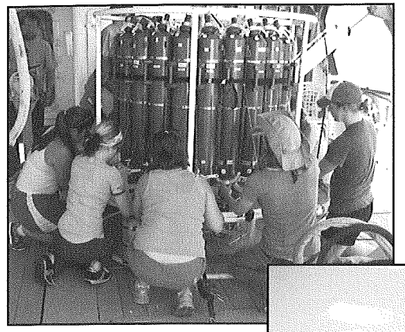
The research vessel *Seward Johnson* carries eleven crew members, two marine technicians, eight submersible crew members, and as many as twenty scientists. The ship is equipped with a wet lab, a dry lab, an electronics lab, a walk-in environmental room, workshops, a gym, and a lounge with DVDs and a big-screen television.



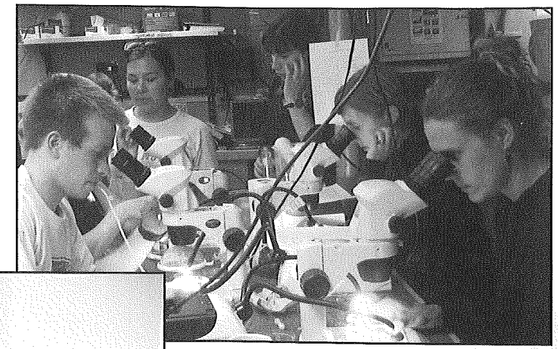
Deep sea crinoids

The deep-sea biology course has now been offered twice at the University of Oregon, with the previous course being taught in 2003 at cold methane seeps in the Gulf of Mexico. The course is offered intermittently as space is available on funded cruises. Over the past twenty years, Young and Tyler have offered versions of the course seven times, including five times in the Bahamas, once in the Gulf of Mexico, and once in Iceland. Students are strongly encouraged to publish the results of their class projects in the scientific literature. Of the fifteen students participating in the 2003 deep-sea cruise, eight have now authored or coauthored publications that began as course projects.

Biology Lessons on the Ocean Floor



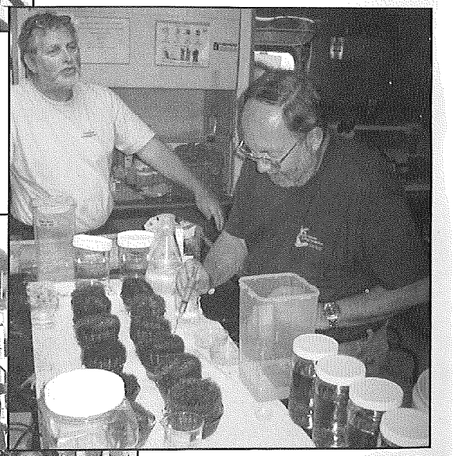
Students preparing CTD



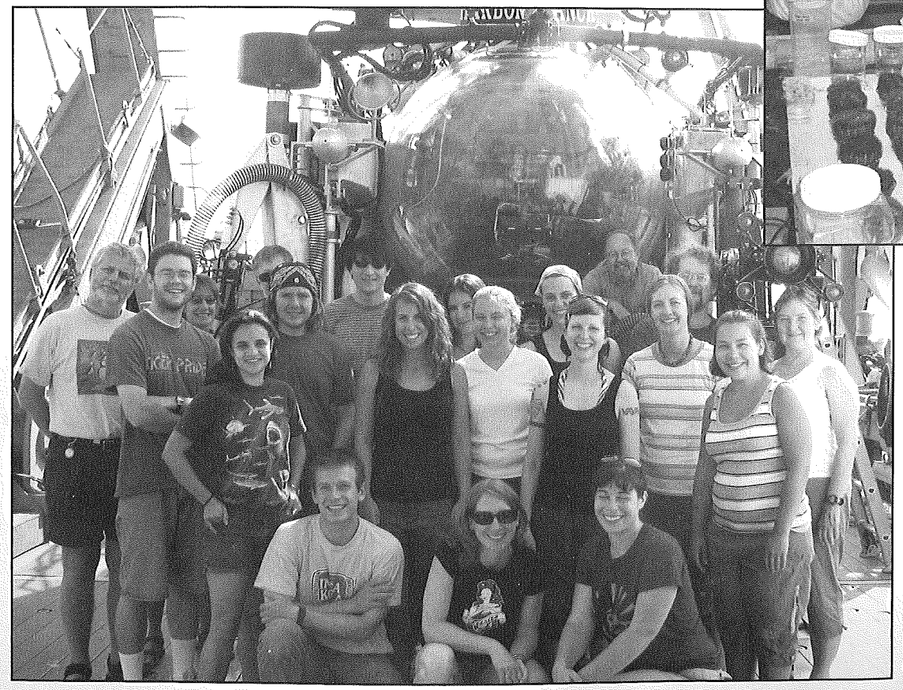
Students sorting plankton

Snorkeling expedition

Tracy Smart in sub



Professors Tyler and Young spawning urchins



Group photo

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