

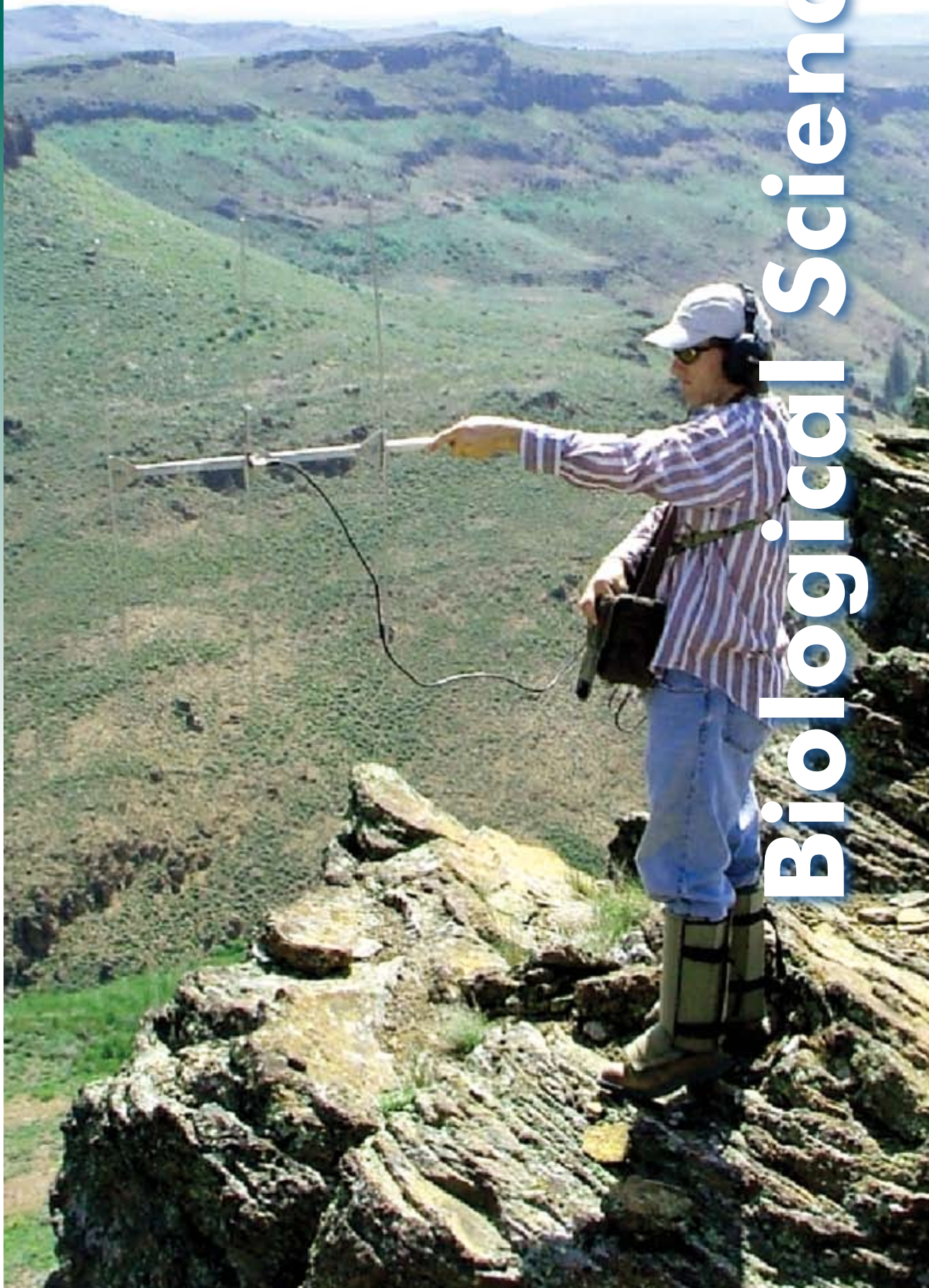
DECEMBER 2007

Department of  
Biological Sciences

Annual newsletter  
for alumni, students  
and friends



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# Biological Sciences

December 2007

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Terry Bowyer

**Assistant Chairs**

Gene Scalarone Jack Rose

**Faculty**

**Ecology/Evolution**

Akersten, W.	Baxter, C.
Bowyer, T.	Delehanty, D.
Germino, M.	Finney, B.
Hill, J.	Huntly, N.
Inouye, R.	Keeley, E.
Kelchner, S.	Kie, J.
Matocq, M.	Murphy, P.
Peterson, C.	Smith, R.
Williams, R.	

**Biomedical/Anatomy & Physiology**

Anderson, C.	Cretokos, C.
Groome, J.	Meldrum, J.
Rodnick, K.	Rose, J.
Seeley, R.	Stephens, T.
Thomas, M.	

**Microbiology/Biochemistry**

Brandon, M.	DeVeaux, L.
Evilia, C.	Farrell, L.
Galindo, S.	Magnuson, T.
Nehr-Kanet, S.	Scalarone, G.
Sheridan, P.	Shields, M.
Spiegel, K.	St.Hilaire, S.
Winston, V.	

**Lecturers/Lab Coordinators/Adjunct**

Aho, K.	Bala, J.
Black, C.	Bunde, C.
Crandall, A.	Farrar, R.,
Frank, B.	Fultz, J.
Harmon, K.	Kazakevich, M.
Ledbetter, R.	Loxterman, J.
Ogden, H.	Perkel, J.
Shurley, J.	

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Jason Brahosky	Shauna Chlarson
Pam Christensen	Sunshine Denney
Chuck Edinborough	Mathew Farnes
Noreen King	Sandra Mitchell
Mia Nettik	Erin O'Leary-Jepsen
Kari Peterson	Susan Rittenhouse
Hannah Sanger	Mary Ann Stoll
Brad Thomas	

**Cover photo**

Giff Gillette doing telemetry of mountain quail in Bennett Hills.

**Contact information**

The annual newsletter of the Department of Biological Sciences at Idaho State University is published in December. Address comments or questions to: Dr. Terry Bowyer  
Department of Biological Sciences  
Idaho State University  
921 S. 8th Ave, Stop 8007  
Pocatello ID 83209-8007  
ph: (208) 282-3765  
bowyterr@isu.edu

# A word from the Chair



Dear alumni, students, staff, faculty, and friends:

This academic year has been one of change for the Department. Dr. Kathleen Spiegel is now a Professor Emeritus, and Drs. Larry Farrell and Rod Seeley will be retiring this spring. Two new professors have joined our faculty. Dr. Chris Cretokos comes to us from the M.D. Anderson Cancer Center in Houston, Texas, and Dr. Bruce Finney, a renowned stable-isotope biologist, joins us from the University of Alaska, Fairbanks. Both complement our diverse and growing teaching and research missions. Drs. Nancy Huntly and Richard Inouye are serving as NSF rotators in Washington, D.C., and will return to the Department upon completion of this important assignment. We continue our new collaborations with the University of Idaho, hosting joint receptions for our alumni at professional meetings, and holding a professional workshop showcasing our faculties, which alternates between Moscow and Pocatello. This year the workshop returns to ISU. Focusing on predator-prey dynamics, the symposium will run concurrent with an international workshop on sabretoothed Mammals organized by Dr. Bill Akersten. Dr. Nancy Grim from Arizona State University was the first recipient of the G. Wayne Minshall Lectureship in Ecology. The Department and ISU remain an intellectually vibrant and exciting place to work and study. Plans for remodelling the Gale Life Sciences Building are moving forward, and will include the adjoining Idaho Biomedical Research Institute, with which many of our faculty are affiliated. We continue to depend upon our alumni for support to maintain our academic excellence. I hope you will consider helping with this critical need.

Best regards,



R. Terry Bowyer  
Professor and Chair

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# Drs. Seeley and Farrell retire

Idaho State University's Department of Biological Science will retire two of its elder statesmen this Spring. Dr. Rod Seeley earned his Ph.D. from Utah State University (1973) and became an Assistant Professor in Biology at ISU the same year. Rod has taught numerous courses at ISU, including introductory biology, histology, anatomy and physiology, pathobiology, comparative physiology, and endocrinology, and has been a major part of our undergraduate advising program. He was the ISU Distinguished Teacher in 1986, and has received numerous other teaching awards. His research originally centered on reproductive endocrinology, and Rod published eight papers in that field. Most recently he has focused on how to teach students to apply techniques of higher-level thinking and problem solving to anatomy and physiology. Rod is co-author of numerous books in Anatomy and Physiology, which he developed as part of his research into the concept of critical thinking in anatomy and physiology. The first book, *Anatomy and Physiology*, is in its eighth edition; the second, *Essentials of Anatomy and Physiology*, is in its sixth edition. Rod has served on many university and community committees, including the District #25 School Board. He was chairman of the School Board in 1984-86. Rod was Chairman of Biological Sciences from 1986 to 2001, during which time the department experienced considerable growth; the number of undergraduate FTE's increased from 2,040 per semester to over 5,200, graduate FTE's enrollment jumped from 296 to 381, and about a dozen new faculty positions were added during that time.



Seeley

Dr. Larry Farrell was awarded his Ph.D. from the

University of California at Los Angeles (1970). Upon graduation he became an Instructor at the University of Illinois College of Medicine in Chicago, and joined ISU's Department of Microbiology and Biochemistry as an Assistant Professor in 1972. He became chair of that department in 1977, and was tenured and promoted to associate professor in 1978. After Microbiology and Biochemistry merged into the Department of Biological Sciences in 1984, Larry served as its assistant chair from 1988-1990. His outstanding performance resulted in his promotion to professor in 1989. Larry taught most courses related to virology or microbial genetics for the Department, and his course on Acquired Immune Deficiency Syndrome has remained one of the most popular classes at ISU. Indeed, he was awarded The Body.Com Leadership Award as an Outstanding Prevention Educator in 2005. Larry has been involved with bacteriophage research for years, and has collaborated with other faculty investigating the horizontal transfer of pathogenicity genes. His public service has been exceptional. He received the ISU Distinguished Public Service Award in 1990, and was recognized as a Master Teacher in 1992.



Farrell

Larry and Rod's long and distinguished careers have had huge and beneficial effects on the students who were fortunate enough to take their classes. Their courses were always challenging and filled with their excitement for biology; both took special pride in those they educated. The success of our program and our students are the result of their endeavors throughout over three decades of service to ISU.

## Awards to Biology faculty and students in 2007

- ISU Biological Sciences Scholarship  
Kara Rossback
- ISU Albert Strahan Scholarship  
Heidi Albano
- ISU Edson Fichter Scholarship  
Sam Matsaw
- ISU Barry Keller Memorial Scholarship  
James Jackson
- Undergraduate Degrees Awarded: 123
- Master's Degrees Awarded: 14
- Doctorate Degrees Awarded: 11
- Number of Publications: 56
- Extramural Grant Funding: \$3.35 Million





**Dr. Marjorie Matocq**

## National Science Foundation grant brings research to high schools

Associate Professor of Biological Sciences Dr. Marjorie Matocq, was awarded a \$509,896 NSF award for the project “CAREER: The roles of ecology, behavior, and morphology in maintaining species boundaries – demonstrating evolutionary processes to high school students in Idaho.” This award will give ISU doctoral and undergraduate students the opportunity to share cutting-edge genetic and evolutionary research with high school teachers and students.

**MOTR**  
**Molecules on the Road**

The techniques students are learning in the high school classroom are some of the fundamental methods used in a rapidly expanding number of professions including medicine, biotechnology, and basic research.

CAREER, a National Science Foundation Faculty Early Career Development Program, offers the NSF’s most prestigious award in support of those individuals who most effectively integrate research and education.

“Through this grant, we extend components of the research into a high school program,” Matocq says, “in addition to educating graduate and undergraduate participants.”

Matocq will incorporate her research on the processes that generate and maintain biodiversity into a high school outreach program. Specifically, this program will train local high school biology teachers in molecular genetic techniques; Matocq will collaborate with them to present these techniques to their students and integrate these activities into other components of the curriculum.

“The outreach program will be a model partnership

**“The outreach program will be a model partnership between high schools and universities, cost-efficiently exposing students to modern molecular genetics and evolutionary research,”**

**-Marjorie Matocq, Ph.D.**

between high schools and universities, cost-efficiently exposing students to modern molecular genetics and evolutionary research,” Matocq says.

For the research component of the award, Matocq explains that the conservation of biodiversity requires an understanding not only of the factors that contribute to diversification and speciation but also of the population dynamics that allow species to remain distinct from one another. Matocq will integrate a series of field and lab studies to identify how ecological, behavioral, and morphological factors allow hybridization but prevent widespread gene flow between two species of woodrat, *Neotoma fuscipes* and *N. macrotis*.

The integrated research and educational activities will train students at various educational levels in the scientific method with special emphasis on molecular genetics and evolutionary processes. These individuals include high school students from the Shoshone-Bannock Tribes, ISU undergraduates, ISU doctoral students, and local high school biology teachers.

At the university level, this grant will train two Ph.D. students in Matocq’s research area, expose at least 10 undergraduate students to her research, and provide support for one postdoctoral researcher.

# Department focuses on science writing

Science may be done in the lab or in the field, but it is through communication – whether in the form of grants, scientific articles, or oral presentations – that researchers share their findings with their colleagues and the public. At this year's faculty retreat the Department made the collective decision to enhance writing in the Biology curriculum.

As part of that initiative, adjunct assistant professor Dr. Jeffrey Perkel, launched a new undergraduate Science Writing course for Fall 2007. Eight students enrolled in the class, which covered all manner of scientific communications, including poster presentations, oral presentations, scientific research papers, grant applications, and articles for "lay" audiences.

Science writing is a topic Perkel knows well. For nearly six years he was senior editor for technology at *The Scientist*, a news magazine for the life sciences. When his wife, Dr. Caryn Evilia, was offered the department's Assistant Professorship in Biochemistry, the family picked up stakes and moved west – a double "score" for the Biology Department. In addition to teaching regular Biology classes, he continues to write as a freelance science journalist. His work has appeared in *The Scientist*, the scholarly journals *Science*, *Analytical Chemistry*, and the *Journal of Proteome Research*, and in HealthDay News, a national medical newswire.

Science Writing (BIOL 399) will be offered again this Spring. It is open to juniors and seniors from all scientific disciplines.

## ISU Biology In the press

ISU's Department of Biological Sciences garnered national media attention twice this past September. The Associated Press highlighted work by Dr. Sophie St. Hilaire, a veterinarian and research assistant professor, which could pay dividends for Idaho's trout industry. *The Washington Post*



profiled associate professor Dr. Linda DeVeaux's studies on microbial radiation resistance.

St. Hilaire's research is perhaps the ultimate embodiment of turning lemons into lemonade. The lemons: cow manure, fish guts, and maggots. The lemonade: fish food. The recipe: black soldier fly maggots, grown fat on cow manure, are harvested, pasteurized, and made into fish chow.

"The maggots are 40 percent protein, and 30 percent fat. It's amazing,"

says St. Hilaire. "We are taking this manure, this stuff they don't know what to do with, and converting it into the perfect Atkins diet food."

The maggots can partially replace the expensive protein and oil that goes into standard fish diets – savings that could reduce the cost of trout farming, while helping Idaho farmers make cash cows of cow pies. St. Hilaire hopes to boost that benefit by spiking the manure with fish innards, to increase the feed's omega-3 fat content.

"We're making aquaculture more sustainable, so they don't have to rely on natural resources as much," St. Hilaire says.

But, do trout raised on a diet of manure- and fish gut-fed maggots taste different than other fish? "My husband and I have already tried it," St. Hilaire says, "They don't." A more rigorous taste test is in the works.


Meanwhile, DeVeaux, addressed a different question: "What is the biological limit of radiation resistance?" Radiation is sometimes used for microbial neutralization and sterilization, for instance of food or bioterror agents. But some organisms survive, and DeVeaux wanted to understand how.

Working with collaborators at the Idaho Accelerator Center and University of Maryland, she created mutants of *Halobacterium* NRC-1, a microbe that lives in hypersaline environments such as the Great Salt Lake, which can withstand a record radiation dose of 12,000 Grays – 50% more than the next most-resistant organism known, and 2,400 times more than humans. DeVeaux then identified DNA repair differences that apparently confer this resistance.

The results, she says, offer insights not only into the mechanisms of radiation resistance, but into human health as well. "If we understand how cells overcome neutralization attempts, we can circumvent those mechanisms," DeVeaux explains, whether in cancer patients undergoing radiation treatment, or in contaminated food.

Her work appeared in *Radiation Research*; St. Hilaire's was in the *Journal of the World Aquaculture Society*.





# SEX, HORMONES, HEARTS, AND FISH:

## Research from the Lab of Dr. Ken Rodnick

Dr. Ken Rodnick's lab constitutes one of the most focused and prolific research groups in the Department and at ISU. Currently comprising two undergraduate and four graduate students, Rodnick's team applies a range of research approaches to study how sexual identity affects cardiovascular physiology in fish. Their tools range from electrophysiology and molecular techniques in the lab, to measurements of respiratory gas exchange of fish in the field.

Central to Rodnick's research are sex differences in heart function. There is a growing appreciation of significant sex differences in cardiac characteristics and function in adult humans; Rodnick's latest research begins to close that gender gap in fishes. His team finds that sex differences in cardiac performance and metabolism exist in rainbow trout. These differences occur at a young age and are only realized when the trout heart is contracting and not under resting conditions.

One of the key differences between the male and female heart is its response to stress. Females appear to tolerate low oxygen better whereas males possess a larger outermost (epicardial) layer of the ventricle vs. the inner endocardium layer. Ultimately, sex differences in cardiac energy metabolism and function may help define habitat suitability, swimming capabilities, and health status of wild and hatchery-reared rainbow trout. This research could also improve our understanding of human heart disease, leading to sex-specific treatment.

Dr. Rodnick was ISU's Distinguished Researcher in 2004-2005, and he has been able to support his lab's research through grants from NSF, NIH INBRE, USDA, EPA, and the aquaculture industry. Research in his lab strikes a fine balance in contributing to basic physiology, biomedical science, and Idaho's dominance of the trout farming industry.

## Alumni Profile **Plant Physiological Ecologist Alan Knapp**

Alan Knapp came to the ISU Biology Department from Ashton, Idaho, earning his BS in 1979.

As an undergraduate, Knapp did independent research under Professor Jay Anderson on the dependency of lodgepole pine seeds on heating for germination. Cones of this species require fire to promote seed release (referred to as "serotiny"). He published his undergraduate research in *American Midland Naturalist*, and went on to University of Wyoming to earn his Ph.D. in Plant Physiological Ecology.

Subsequently, Knapp joined the faculty at Kansas State University, where he built a renowned research



program on tallgrass prairie responses to climate, grazing, and fire. He recently moved to Colorado State University in Ft. Collins, where he is a full professor.

His research on these topics can be found in *Science*, *Nature*, and *BioScience*, and in scores of other research publications in top ecology journals, as well as in an Oxford University Press book entitled "Grassland Dynamics: Long-Term Ecological Research in Tallgrass Prairie".

Professor Knapp is currently leading continental-scale experiments aimed at helping us understand and predict future ecosystem responses to climate. His academic career in Plant Physiological Ecology is perhaps the most distinguished of any faculty or undergraduate alum of ISU.

# Thank You

... to the following individuals who have contributed to our endowment funds in the past year. We regret any errors or omissions.

Dr. and Mrs. Dan Anthony Alex  
Mr. Carl Anderson  
Mr. and Mrs. Ed Bala  
Dr. and Mrs. Carl D. Barrentine  
Mr. and Mrs. Stuart Willis Bright  
Mr. and Mrs. Walter Ray Browne  
Mr. Jay Bunce  
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Special thanks to:

**Drs. Ron and Joan McCune**  
for donating \$10,000  
for a new endowment fund

## Idaho's Future: A great investment

Did you know tax rules make your gift to ISU's Department of Biological Sciences a better investment than ever?

The State of Idaho Income Tax Credit for educational institutions allows a TAX CREDIT equal to 50% of your contributions for the tax year. That's in addition to state and federal TAX DEDUCTIONS a person or couple may claim.

On a joint taxpayer return, the maximum tax credit allowable is \$200 or 20% of income tax liability for the year, whichever is less. The maximum tax credit allowable for a corporation is \$1,000 or 10% of that corporation's total income tax for the year, also whichever is less. For details, visit <http://support.idahopty.org/deductions.asp>.

Say you earn taxable income of \$40,000 and itemize your deductions. Your \$125 contribution to one of our endowment funds could in fact cost you just \$35, because the gift could offset \$16 and \$11 in deductions on federal and state tax returns, respectively, in addition to a \$63 Idaho tax credit. That means it's never been easier to ensure the next generation of students get the same high-quality education you experienced.



# ISU alumnus links research and practice in medical education

*Research training helps Chester hone critical-thinking skills*

Mike was selected by UW to receive a summer research appointment at the Seattle Biomedical Research Institute in 2005. He studied viral evolution in HIV under the direction of Dr. Nancy Haigwood on a NIH-funded effort to develop an AIDS vaccine.

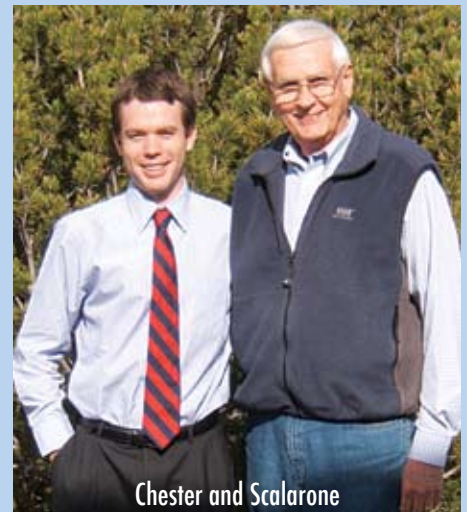
One of the principle challenges in developing an AIDS vaccine is that antibodies must be capable of neutralizing a wide range of HIV strains, which are continuously evolving. Mike examined a set of antibodies obtained from HIV-infected individuals termed “long-term non-progressors” because they do not exhibit the full symptoms of AIDS. His subjects also developed HIV at different years over the past decade or so, offering a chance to study the change in the relationship of HIV strain and antibodies.

Mike found that antibodies from

people infected with HIV in past years past were not able to neutralize more recent HIV strains. The opposite was also true; recently evolved HIV strains were apparently more capable of shielding binding sites from older antibodies.

Proud though we are of Mike’s stellar achievements since graduating ISU, we are not surprised by them. After all, he was lead- or co-author on three peer-reviewed publications and 11 national presentations under Dr. Scalارنة. An undergraduate research internship at the NIH lab in Hamilton, MT, led to yet another publication.

“There is no limit to what a student can achieve in (ISU’s Biology) department,” says Mike. Clearly, his record is a case in point!



Chester and Scalارنة

Mike Chester, BS Microbiology ('05), went from a prolific research experience as an undergraduate in Dr. Gene Scalارنة’s lab to an impressive blend of basic research and medical training at University of Washington’s medical school.

We caught up with Mike during a medical school rotation in Pediatrics at Pocatello Children’s Clinic.

“Participating in research has helped me develop critical thinking skills that are important in medical practice,” he says.



## Department of Biological Sciences

Idaho State University  
921 S. 8th Ave., Stop 8007  
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