

Premiere Issue



Director's Address

This is the first issue of the new SOLS newsletter. Our goal is to put out two issues per year, initially, then expand to three. Our purpose is to reconnect emeriti and alumni from the foundation departments within SOLS and to showcase the activities of our faculty, staff, and students. Each issue will contain features highlighting interesting ongoing research by students and faculty. We'll "find" successful

alumni and catch up with their careers, and "track down" emeriti and look at their activities in retirement. This will be an instrument to increase our visibility.

SOLS has hatched and is now in the fledgling stage. It is important for us to maintain contact with our origins and to develop our own future. SOLS may not be unique, but it certainly is a different collection of life sciences, both administratively and academically. Our colleagues are looking at us as an experiment for the new biology, some with envy, some with skepticism, but all with interest. This newsletter will document our progress and success as a new model in the life sciences.

I want to thank Faye Farmer, Dave Brown, Patricia Duncan and the cadre of "reporters" for their enthusiastic assault on this project. The production crew consists of faculty, staff, graduate students, and undergraduates. Newsletter design was by Jacob Sahertian from our own Visualization Laboratory. Together, they have produced a first class product to showcase the School of Life Sciences.

Robert E. Page, Jr.

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Who is SOLS?

The proposal for the new School of Life Sciences was enthusiastically approved by the university administration and by the Arizona Board of Regents in Fall, 2002, which incorporated the three academic departments of Biology, Plant Biology and Microbiology. The new unit began operation in July 1, 2003, making possible new collaborations and creating new opportunities for the life sciences at Arizona State University.

As far as who exactly is SOLS... this newsletter will endeavor to show you.



Focus on Faculty

Listening to your Passion

Faye Farmer

James Collins, professor of Ecology, Evolution, & Environmental Science, has received several honors during his tenure at Arizona State. He is currently the Virginia M. Ullman Professor of Natural History and Environment in the School of Life Sciences. Most recently, Professor Collins has accepted a position

as head of the National Science Foundation's Directorate for Biological Sciences. Collins' laboratory consisting of several graduate and undergraduate students, as well as his staff, will remain functional and funded throughout his two year commitment to the NSF.

Collins' studies of morphological variation experienced by salamanders in response to environmental cues, and the effect that variation has on population dynamics resulted in one of the first published links between disease and regional amphibian mortality. Currently, his laboratory is studying the role of disease in the global decline of amphibians. His prolific research and expansive career have garnered him multiple accolades, locally and nationally.

However, Collins did not see himself thriving in the profession that many of his male relatives chose, law enforcement. He took another track entirely. After completing his undergraduate degree in biology at Manhattan College, where he became and remains a vociferous supporter of their basketball team, he completed his Ph.D. at the University of Michigan in 1975.

Moving to Arizona with a young family in tow, he spent fifteen years with a laboratory space in the basement of the Life Sciences C Wing before moving into an office with a window.

During Collins' career as a professor at ASU, he has spent years teaching a variety of graduate and undergraduate courses. He has taught several semesters of Introductory Biology for Majors as part of his personal commitment to place research professors into large introductory courses. He has also helped improve curriculum at the undergraduate level at ASU (see "Great Courses" on pages 13-14) and emphasized the need for students at all levels consider the ethical implications of their research.

In keeping with his dedication to ASU and undergraduate education, Collins will be the keynote speaker for the 13th Annual Undergraduate Research Poster Symposium held on February 24, 2006 (see campus happenings within this newsletter).

SOLS is fortunate that Collins followed his passion and resisted the temptation to become a law enforcement officer. Instead, he became a dedicated, endeared and world-renowned scientist at ASU. Destiny continues to honor his family's professional leanings however. Earlier this year, Collins' youngest daughter married a law enforcement officer.



Keeping Up with the Emeriti

Farming Young Minds

Faye Farmer

Emeritus Professor **Ronald Alvarado** vowed never to go back to farming once he left the small San Bernardino citrus ranch that was his birth place. Pursuing an undergraduate degree in general biology at the University of California Riverside was his ticket off the farm and out of town.

From Riverside, he went on to receive a Master of Science and Ph.D. from Washington State University. His field of study and eventual area of research was "zoophysiology". Alvarado began his career at ASU in 1974, as professor and chairman. During his tenure at ASU, he served as Associate Dean for the College of Liberal Arts and Sciences.

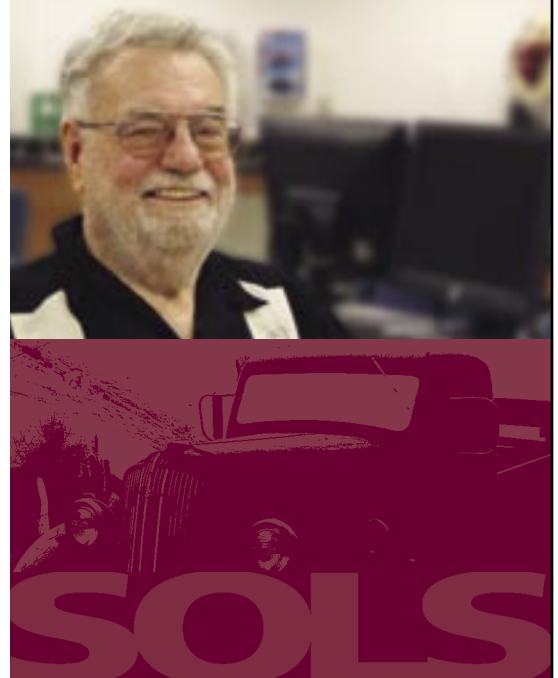
In addition to his work at ASU, Alvarado served as a Program Director of Physiology with the National Science Foundation. After a lifetime of teaching and service, Alvarado retired in 1996. Since that time, he has continued to participate in university development as a part-time consultant to ASU's College of Extended Education, working on the development of general science laboratory space for ASU's Downtown Campus. He is also a member of the college council of the

Emeritus College, where retired faculty can continue to cultivate their intellectual and social interests

Much to Alvarado's surprise, he is back on the farm again. He spends every Thursday in a classroom filled with middle school students at Marigold Elementary instructing with activities in hands-on science. Marigold Elementary is a charter school in Central Phoenix commonly referred to as the "farm."

The school represents Alvarado's commitment to the study and enjoyment of science, with particular emphasis on addressing minority and underserved communities. Throughout his time at ASU, he worked towards the education and academic retention of minority students in the sciences, and initiated research in the hope of discovering the elusive reasons students leave the study of science. He has not identified the reasons for this attrition, but he has spent his life attempting to expand young minds in order to ensure they continue in science.

Professor Alvarado has spent his years carefully cultivating minds, which means he never really did leave the farm after all.



Keeping Up with the Emeriti

The Sweet Smell of Success

Faye Farmer

An open sewer system to the northeast added an unwelcome tang to the air as it wafted past students. When that unwelcome cloud of scent merged with the aroma of the large cattle feeding lot just to the southeast, it meant that you were on campus.

The small drive called College Avenue wound its way to the river, and a small turn off to the east led to the biology building. Faculty housing was tucked among insect-filled cotton and sorghum fields that acted as large, green borders between houses. Tempe and its environs made for an idyllic town, one that supported a college of 12,000 students. This was the ASU that **Charles Woolf** chose to join in 1961.

Professor Woolf moved to Tempe from the University of Utah to begin teaching the first classes on genetics for biology students in 1961, in conjunction with a research laboratory. His teaching load for those first few years was three classes per semester, and each class had up to 300 students. It was a time when you had to get your library card punched in order to check out books. You used mimeographs and slide rules rather than computers, copy machines and hand-held calculators.

Woolf fondly recalls the large boxy Monroe Calculator that was a prized piece of machinery from the laboratory, even though it failed to take a square root. Equipment, teaching

and ASU itself changed dramatically over the years. Woolf was a member of the campus.

He spent nearly half of his 28 working years in administration, from 1973 – 1986. As Dean of the College of Liberal Arts and Sciences, Dean of the Graduate College, and Vice President for Research during that era, Woolf was a witness to monumental change: ASU's sports program blossomed, its student body tripled, and the second library on campus, Noble Science and Engineering Library, was constructed.

Professor Woolf has spent the last 16 years as Emeritus faculty. At age 80, he remains active, spending each morning and early afternoon on campus composing manuscripts on genetics in the first office he occupied in 1963. His research has taken him from the study of flies (*Drosophila*) to horses, all the way to humans, while investigating the origins of asymmetry in bilateral organisms. He has concluded that certain types of asymmetry in these organisms is influenced largely by chance events during development.

The growth of ASU over the course of 45 years, while asymmetric, has not been due to chance however. The development of the institution has been due to purposeful direction and management, and support from individuals such as Charles Woolf.



Keeping Up with the Emeriti

An Interview with Emeritus Professor Kenneth Hooper

Daniel Jenk

Kenneth Hooper, emeritus professor and former Chair of the Plant Biology Department, retired in May 2004 and was kind enough to reflect on his career at ASU.

Q: Dr. Hooper, thank you for coming in to interview. How did your career in science begin?

A: The door to my career opened in a high school chemistry class. It led to an undergraduate degree in chemistry at Goshen College in 1960 and a Ph.D. in biochemistry from The University of Michigan in 1965. During a postdoctoral year at Vanderbilt University with Stanley Cohen and two years at The Rockefeller University with Günter Blobel, Phil Siekevitz and George Palade, I worked with three scientists who later received the Nobel Prize. At Rockefeller, I began working on a project to study membrane biogenesis with the alga *Chlamydomonas reinhardtii*, from which I would learn for the next 40 years.

Q: How did you find your way to ASU?

A: Membrane biogenesis, even in a plant cell, was an acceptable research program within a medical school, and from 1968 to 1991 I was a faculty member in biochemistry departments, first in Rutgers Medical School and then for 20 years in Temple University School of Medicine. Because the membrane we studied contained the photosynthetic apparatus, over the years I learned something about photosynthesis, and in 1984 published the book *Chloroplasts*. I reached a stage in my 50s, which may be common, when I needed to decide whether to settle into my position as Chair of the Department of Biochemistry or do something different. Because I was working with a photosynthetic organism, I applied for the open position of Chair of the Department of Botany (later Plant Biology) at ASU, with the possibility of association with the Photosynthesis Center. I accepted the offer of this position without having a formal course on vascular plants. The intellectual climate and facilities at ASU, particularly in microscopy, encouraged remarkably creative research by my students. I consider the work done by my research group at ASU to be the best of my career.

Q: Did you always plan on being an administrator?

A: In my early years as a faculty member, I didn't consider ever being involved in administration. Yet, as fate would have it, I was a Chair at Temple University for three years and then nearly twelve years as a Chair at ASU.

Q: What was some of the research you did while at ASU?

A: Most of the significant scientific advances in my lab were made while looking for something else. A particularly satisfying achievement, which was probably more of a "eureka" moment than an achievement, was an idea that entered my mind about the chemical properties of chlorophylls that determine how they interact with proteins. This was an idea that entered my mind while I idly watched the sea on a cruise with my wife along the Norwegian coast. The idea led to experimental data obtained by both Dr. Laura Eggink, then a graduate student in my lab, and me that were published in papers in the *Journal of Biological Chemistry* and *Journal of the American Chemical Society*. The maturation of this idea had given me the most scientific pleasure, until recently. Since my time at Temple University, I had been involved with a side project on the serum macrophage activating factor, called GcMAF, which is a key component in activity of the immune system. While at ASU, Dr. Ilga Winicov and I tried to develop a source of the protein by expressing the human gene in the roots of plants, which was funded by a grant I received (see <http://researchmag.asu.edu/print/alfalfa.html>). But, because the level of expression was low, Dr. Eggink took a novel approach around the problem and developed a small, synthetic compound that mimics GcMAF. The compound looks like a duck (to the immune system), acts like a duck, but is not a duck. Consequently, it has enormous promise in immunotherapy. This discovery also came from a "What if?" idea. My experience has led me to think of the scientific method as a means of validating an idea rather than a path of discovery.

Q: What are some of things that you remember most fondly from your career at ASU?

A: I was very proud of the accomplishments of the Department of Plant Biology and pleased with the willingness of the faculty, students and staff to work together and to go in new directions. One particular initiative of note was development of the undergraduate Molecular Biology and Biotechnology major, which was designed to prepare students for the curriculum they would encounter in medical schools. In addition to this critical need, we thought that training students to support the interest in development of biotechnology within the university and state was important. This program was finally approved in 1999 and has received significant interest from students. I also worked with Dr. Rosemary Renault, then Chair of the Department of Mathematics, to form the Master's program in Computational Biosciences, which provides a well-trained group of people in support of biotechnology. I hope that administrative emphasis on these programs increases.

Q: What are you up to now?

A: The technology developed by Dr. Eggink was submitted for patent protection by Arizona Technology Enterprises, and in August 2004 we formed a start-up company, SolarPharma LLC. The lab was moved into the Phoenix Biotechnology Accelerator in downtown Phoenix. We are presently pursuing the support needed to build this enterprise.

Q: On a lighter note, how do you enjoy your time away from work?

A: I enjoy weekend dining at various restaurants with my wife and viewing our Saturday evening movies. I have also enjoyed the opportunity in Phoenix to ride my bicycle every weekend of the year, in contrast to the limited opportunities provided by the weather in Philadelphia. When time allows, I enjoy reading books on psychology and philosophy.

Thank you again Dr. Hooper, and hope to see you at the next photosynthesis seminar.

Current Research

Everything under the sun

Jonathan Handka

Leslie Landrum, herbarium curator and researcher, has overseen the development of a program for the SOLS Web site that brings Arizona's flora to the public. The *Flora Explorer* searches a plant list for any given area in the state of Arizona. For example, one can get a species checklist for all specimens that are associated with the Pinal Mountains. Most species will also be illustrated.

Currently, the site only has scientific names, but plans are to incorporate common names in the future. There is also a locality list where you can find a database that will give you a list of the species you can expect to find there. Either approach will give you species specific information, pictures, and distribution maps. With this feature you can bring up a map of Arizona (or the World) and sites where specimens of a chosen species have been collected.

To access *Flora Explorer*, go to the main SOLS Web site (<http://SOLS.asu.edu>), find *Natural History Collections*, click on *Vascular Plant Herbarium* and then, click on *Websites*. From that page, scroll through the different sections to determine how best to complete your search.

The Web site is one of the most comprehensive tools available for Arizona plants. "We have about 255,000 accessioned specimens," says Landrum. Of these, about 110,000 have been collected in the last 20 years. About 40 percent of the collections are from Arizona. The collection of Cactaceae, the cactus family, is among the best in the world. This is due to years of work by professor **Don Pinkava** and his students. Additionally, the lichen herbarium, maintained by professor **Thomas Nash**, is one of the best in the Western Hemisphere.

Despite being one of the best herbaria in the Southwest, the vascular plant herbarium has on average less than one specimen for every square mile in Arizona. A lot of work remains to be done.

According to Landrum, there are still many places in Arizona where botanists have not explored. About one additional species is discovered in the state every month despite more than 160 years of collection. Most discoveries are new introductions to the area, or rare species that have only recently been found. Occasionally a species new to science is discovered. One example is *Eriogonum teneratum*, a wild buckwheat, which was discovered by John Anderson and Elizabeth Makings in southern Arizona.

Landrum is also an ASU representative for the Organization for Tropical Studies (OTS). OTS conducts a graduate program, with classes held in Costa Rica for six to eight weeks. If the student is accepted, then all expenses are paid by ASU. There are similar programs for undergraduates, but qualified students must pay the expenses for those trips.



Cactaceae: *Echinococcus triglochidiatus*
Engelm var. *melanocanthus*
(*Engelm*) *L. Bers* (detail)

Current Research

Tony Gill: SOLS' Guardian of Evolutionary Space and Time

David Brown



There was a time when institutions sent forth collectors to scour the remote regions of the world to secure plant and animal specimens for their museums. Their motivation was to expand their knowledge of new species and how plants and animals were distributed throughout the world. Only by so doing could the sciences of systematic taxonomy and biogeography advance. Extinct forms were sought as much as extant ones and dinosaur hunting was regarded by such great museums as the American Museum of Natural History and the Smithsonian as a competitive sport. Romanticists, enchanted with the saga of Captain Bligh and his crew, would do well to remember that the mission of the *H.M.S. Bounty*, like that of Darwin's *H.M.S. Beagle*, was not to explore enchanted islands, but to collect plants and animals for botanical gardens, herbaria and museums.

Only when all of the specific pieces of the evolutionary puzzle were inventoried and systematically categorized could the systematics of natural history be understood. To facilitate this avenue to higher learning, both private and public museums began amassing regional as well as world class collections. A newcomer to the game, the collections at Arizona State University receive little publicity or attention. Today, only a relative few realize the size and extent of our university's

research collection which contains

- A representative collection of mammals, some 8,500 of which have been catalogued and registered.
- 447 registered birds, including a number of unusual neotropical examples
- Some 20,000 jars of fishes—the best repository of the Arizona's native freshwater fishes in existence
- More than 35,000 catalogued reptiles and amphibians, a collection of Arizona specimens second only that at the University of Arizona
- An exceptional collection of insects, especially regional beetles and flies, that contains from 600,000-700,000 to more than a million specimens
- A comprehensive world-class shell collection.
- An herbarium housing 255,000 accessioned plants, 40% of which are from Arizona, and nearly half of them obtained during the last 20 years. These include one of the world's most important collections of Cactaceae.
- A lichen collection with over 100,000 specimens



ASU School of Life Sciences Newsletter

Who is responsible for these collections? **Tony Gill** has been in charge of the SOLS' animal collections for two years now. Well equipped for his assignment, Gill earned a Ph.D. for his work on fishes at the Australian Museum before working for two years at the U.S. National Museum (Smithsonian) in Washington D.C. Then, after a one year stint with the American Museum of Natural History in New York, and 10 years with the Natural History Museum in London, he was lured to Tempe to become the curator of ASU's Research and Teaching Collections. Working with a troop of other curators specializing in vascular plants (**Les Landrum**), lichens and mosses (**Tom Nash**), fossil plants (**Kathleen Pigg**), and a top-notch database expert (**Robin Schroeder**), Gill and his biologist colleagues are deeply involved in building a comparable database for the animal collections. The database will register all specimens, and incorporate each one in a Web site that will search the specimen database to provide specimen lists, along with pertinent collection and distribution data.

The *Flora Explora* Web site designed by Leslie Landrum (see profile on page 5) is an example of how Gill plans to make the natural history collection more accessible to researchers and students. By going to the Web site, <http://seinet.asu.edu> and selecting *Image Library*, located under the topic heading *Biodiversity*, one can access an on-line image library.

On the same website, selecting *Bioexplora*, again under the topic heading *Biodiversity*, you can choose an area of interest, such as South Mountain Park. This will allow you to obtain a species checklist for all of the plants occurring in the park including scanned photos of live specimens and plants mounted on herbarium sheets. Moreover, by following the appropriate prompts, the user can learn where else the species has been collected. This procedure not only generates a species description and distribution map, it saves wear and tear on the specimens.

In the 1980s it became fashionable to downplay curatorial collections as obsolete, expensive and space-consuming. Interest in museums waned and important collections were dismantled or warehoused. DNA analysis and other procedures have now made collections more important than ever. Researchers can now measure evolutionary changes in both time and space. A smidgen of tissue can not only determine how related one individual is to another, but measure what changes may have occurred in a population over time.

Many Arizona localities have still not been visited by collectors, and species new to Arizona are being discovered at the rate of about one a month. The present uses of collections are therefore both traditional and dynamic. Taxonomists are still attempting to classify some of Arizona's fishes, and **Kevin McGraw**, professor within the Organismal, Integrative, & Systems Biology Faculty, is working on bird plumage pigmentation. Other researchers are involved with other aspects of DNA analysis including the comparison of tissues for chemical and other changes found in past and recent specimens.

Reference books are the end products of any good natural history collection, and ASU has played a major role in bringing a number of texts to fruition. The recently published *Reptiles and Amphibians of Maricopa County* was importantly based on the SOLS' and other institutions' collections. The same can be said for two upcoming books on the inland fishes of the Southwest, and a guidebook to Arizona's reptiles and amphibians. Other future examples include a much needed revision of the classic *Flora of Arizona*, the long awaited treatise on the *Snakes of Arizona*, and *The Lichen Flora of the Greater Sonoran Desert Region*, the latter with two volumes published and one on the way. Another cooperative project with the SOLS Visualization Laboratory, the preparation of a map of North America's biotic communities, will facilitate plotting the occurrence of specimens in different ecological landscapes. Given new techniques and a renewed focus, the old sciences of systematics and biogeography are now more relevant than ever. Gill and the other curators of the SOLS' Natural History Collection are planning on being part of this new renaissance.



Illustrations by Tony Gill (pictured from top to bottom)
1. *Anisochromis Straussi* Female 2. *Anisochromis Straussi* Male
3. *Pseudochromis Magnificus* Male 4. *Rusichthys Plesionarpus*



New Faculty Profile

Introducing Stephen Albert Johnston

Faye Farmer

Henry David Thoreau spent years in the woods before he realized that to make a difference he needed to leave the woods. As a lumberjack, professor **Stephen Albert Johnston** realized the same thing while spending time in the upper peninsula of Michigan after graduating from college. At winter's end, Johnston left the woods with the beginnings of a philosophy that focused on taking action.

Johnston earned a B.S. in Molecular Biology and upon his return from the woods, a Ph.D. in Genetics/Biochemistry and another Ph.D. in Plant Genetics/Plant Breeding, all from the University of Wisconsin-Madison. Johnston credits this formative training in graduate school for teaching him to creatively and critically examine challenges in science.

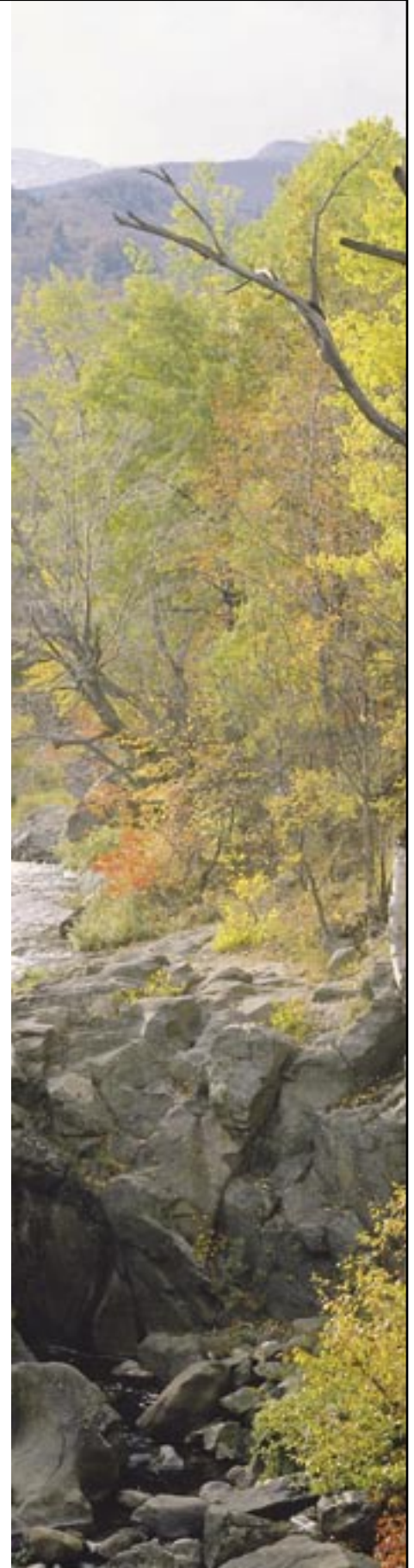
Johnston's unique perspective on scientific challenges has been integral to several of his contributions to science. His major scientific accomplishments include the cloning of the Gal4 eukaryotic regulator and evidence of its dosage effect in 1982 (with James E. Hopper), the first mitochondrial transformation in 1988 (with John Sanford and Ron Butow), and the direct transformation of tissue in living mice with "gene gun" technology in 1991 (with Sandy Williams and John Sanford).

Johnston's success in science has taken him from Pennsylvania State University to Duke University to the University of Texas-Southwestern Medical Center, where he started the Center for Biomedical Inventions (with Tom Kodadek, Skip Garner, Sandy Williams and Bob Meidell), and finally, to ASU, where he is the current director of the Center for Innovations in Medicine.

Johnston admits to hearing about Arizona and vaguely remembers equating the failed Biosphere experiment near Tucson with the Biodesign Institute. But after pivotal conversations with professors **Bert Jacobs**, **Charles Amtzen** and Biodesign Institute Director **George Poste**, Johnston realized his error. He was ultimately convinced that ASU and the surrounding area were going to be the next hub for the innovation Johnston has made his life work.

According to Johnston, his goals at ASU are "to make the biggest impact in the biomedical area as possible." He believes that there are "latent synergies" on campus which hold the potential for greatness. Johnston said that he sees connections between schools at ASU, and believes that creating and fostering communication between diverse groups of individuals will lead to a firestorm of ideas and productivity.

When asked what advice Johnston has for faculty and students, he simply said to "embrace innovation." There are people who have creative approaches to age-old questions and there are people who can support the practical application of that innovation. Both of these individual strengths must be encouraged. Johnston hopes to put his critical analysis and desire for innovation to work for the New American University described by President Michael Crow, with a burgeoning research laboratory filled with students gets to work on the next great science problem.



Campus Life

The New Face of the Library

Faye Farmer

Katherine O'Clair was off to a running start last year, just weeks after being hired by ASU as a Science Reference Librarian. Her pace has not slowed since. In her position, she provides science, engineering and general reference assistance to all students, staff and faculty at ASU. Katherine has also been involved in library instruction for graduates and undergraduates in the School of Life Sciences and the College of Liberal Arts and Sciences.

Within the School of Life Sciences, she has been integral in the development of information literacy curriculum for BIO 187 and BIO 188 (first and second semester general biology), BIO 191 (freshman year seminar in sociobiology), BIO 361 (animal physiology laboratory), BIO 494 (current topics in behavioral ecology), and the Undergraduate Research Program Seminar. She is particularly excited with her work for the freshman year seminar "because it gives the students the opportunity to learn, at an early stage, the skills that will help them to be successful in their educational and research pursuits."

Even though O'Clair graduated with a Master of Science in Library and Information Studies from Florida State University, she will happily share stories of her undergraduate and post-baccalaureate experiences studying birds. She designs many of her workshop and seminar examples for all audiences, around avian research. Despite what a student may have interest in, she uses the topic of birds as an example during these instruction sessions to discuss anything from thermoregulation to cloning.

O'Clair is not your typical research librarian with a bird obsession, in much the same way as the library is no longer your typical library. There was once a time when you had to wait for journals to be bound before you could dive into them. Now, O'Clair will find you the latest electronic journal subscription and show how you can download your article from home at 2 a.m.

The quiet library of the past has been replaced with a one that is abuzz with activity. Today, you can sip your coffee while searching databases on your personal laptop using the wireless Internet. Along with the obvious modernization of equipment, today's university student is Internet savvy and familiar with searching for information resources. O'Clair helps students hone those search skills, find primary sources for research and understand the difference between types of sources, and all over a cup of java on the first floor of the Noble Science Library. She is available for office and class presentations, and she even comes prepared with a topic, birds.

Introducing the Associated Students for Biotechnology

Faye Farmer

The Associated Students for Biotechnology (ASB) is a student organization, which was founded almost two years ago by Will Hendricks, a recent graduate in Molecular Biology and Biotechnology (MBB). The club's objective was to promote all aspects of biotechnology inside and outside of ASU. The club is "really about getting ASU students to figure out where they fit into biotech by the time they graduate" according to current president **Jake Brashears**, a senior in MBB.

Although it's growing in fits and starts, the club plans on motivating its current and future members to study biotechnology by networking with individuals working in industry and academic settings. ASB is organizing a lecture series covering topics that range from bioterrorism, an invited lecture given by **George Poste**, Director of the Biodesign Institute, to entrance requirements of graduate school. A tour of the Biodesign building is also planned. The club is also developing a "traveling curriculum" in biotechnology that takes club members into local high schools as part of an outreach program.

When asked about student involvement in clubs at ASU, Brashears said, "Students should get involved with clubs for two reasons: it's a great way to network within a community and it's the best way to meet people that love the same things you do." He said, "It's also an important method of developing leadership qualities."



Community Outreach

Dear Dr. Biology

Kate Ihle

As ASU begins a new campaign of community involvement, Dr. Biology is reaching thousands of kids, teachers, and parents every year. Dr. Biology is more commonly known as **Charles Kazilek**, director of technology integration & outreach. Kazilek began the popular *Ask a Biologist* Web site (<http://askbiologist.asu.edu>) in 1997. He realized that the Internet provided an excellent avenue to contact SOLS researchers about common biology questions.

The Web site is intended to be used by students in kindergarten through 12th grade, their teachers, and their parents. That constituency can access an army of 150 faculty and graduate student volunteers by e-mailing a question to Dr. Biology. Kazilek and biology graduate student **Tracy Johns** sort the questions and funnel them to volunteers with expertise in the area of inquiry.

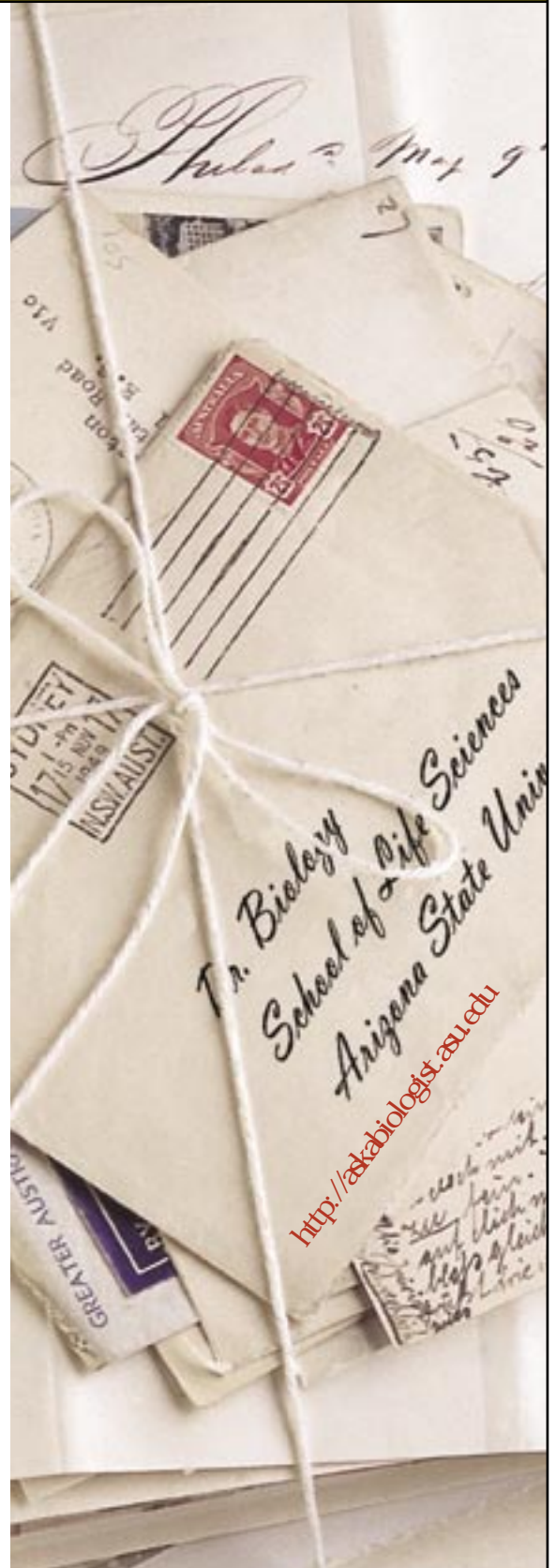
Dr. Biology receives anywhere from 10 to 50 questions per day. The inquiries come from all over the world, with the bulk coming from the United States. Students are discouraged from writing in homework questions. Instead, they are encouraged to explore areas of biology that they are curious about.

Nonetheless, submitting questions on *Ask a Biologist* is only a small part of the Web site. Visitors can also explore hundreds of links to other, more specific biology sites, read articles about SOLS research, play games, learn how to set up backyard experiments and download coloring sheets.

A new feature of the site is the *Birds and their Songs* section. This is a database containing information on more than 200 bird species. Each entry contains a picture and description of the bird for easy identification. In addition, distribution maps, common names, and scientific names are given. Accompanying this information are recordings of the birds' songs.

New content like *Birds and their Songs* is constantly being added to the Web site. This commitment to continued improvement has been widely recognized and *Ask a Biologist* has garnered several prestigious awards. The site was awarded a Digital Education Achievement Award, an Exemplary Web Site Award from the Arizona Technology in Education Alliance, the Arizona State University President's Award for Innovation, and named as a "blue web'n" site by Pacific Bell's Knowledge Network. The site was also named a "safe surf" site.

With the increased recognition of *Ask a Biologist* has come increased popularity. The Web site averages about 1000 unique visitors per day. The number of questions submitted daily to Dr. Biology has steadily risen in the last few years, and so has the number of SOLS volunteers who answer the questions. As ASU embarks on its plan to become the New American University, *Ask a Biologist* is leading the way in community outreach.





SOLS Music

Rick's Gig

Daniel Jenk

You may have recently seen **Richard Olson** delivering packages with a skip in his step or a wry smile on his face. This is probably not because the 1,000th box of restriction enzyme came in or a 200 lb. centrifuge appeared out of thin air in his shipping office.

More likely, Olson is remembering the closing measures of a tune he composed over the weekend or is thinking of a new way to phrase the lyrics to a song he is developing.

Olson, who has been working at ASU as a materials handler and storekeeper since 1985 and in the School of Life Sciences since it was created, has been playing guitar even longer. He got his first paying gig when he was in high school in 1970. Since he has lived in the valley, he has been playing everything from blues to rock in concerts and the studio in his home.

School of Life Sciences professor Robert Roberson played in a band with Olson for nearly five years, which Olson said was an "influential time for both of us" as musicians. Roberson showed Olson how to play Beatles songs while Olson added in his take on the blues.

Olson hasn't just played for fun though; he has used his musical abilities to raise money for special causes. When ASU student Kimberly Nilson disappeared in 1994, he arranged a benefit concert. He and others were able to raise hundreds of dollars to help in a heart-breaking search for her that would last eight months until Nilson's remains were found.

Olson says he has written over 100 songs and has made sure to record them all. On the weekends, Olson listens to and touches up the music he has been recording during the week with the same core group of musicians he has been playing with for nearly 20 years.

The band that Olson plays for is called Liquid Steel (www.liquidsteelband.com) and they have recorded over 130 CDs. Olson said that they don't spend time selling CDs, but rather just sit and listen to what they record on the weekends. He said, "we like our own stuff," and we do it "all for us."

Olson's penchant for recording music was instilled in him by his father who was a jazz pianist. When Olson was little, his father would tell him to get out the reel-to-reel recorder whenever he played to make sure he taped it.

Thanks to Emeritus Zoology Professor Charles Wolf, Olson has been able to listen to his old reel-to-reel tapes. Olson and Wolf are good friends, so when Wolf retired he gave Olson his vintage reel-to-reel recorder and a set of classical tapes that Olson has since converted to CD.

Now, Olson's musical endeavors are focused on writing music and recording in the studio. He usually starts out with lyrics to a song based on stirring experiences in his life and then works the music around it.

Olson's son and daughter are also both musicians. Since his daughter began taking violin lessons, Olson has developed a taste for classical music as well. He has tried to incorporate elements of that style into his current compositions.

When Olson was asked what things in life were the most important to him he said they were "music and my kids... we're literally inseparable." Olson is set to retire in six years, and it's easy to guess what he'll be doing with his spare time. In the meantime, when he stops by your office, watch for that skip in his step and knowing smile.

SOLS Music

The Science Behind the Music

Daniel Jenk

The iconic picture of a research professor is someone with gray hair and thick glasses straining over his lab bench trying to summon order out of chaos. In the School of Life Sciences, the musical pursuits of research professors paint a very different picture.

SOLS professors **Robert Roberson**, **Elizabeth Davidson** and **Ronald Rutowski** are all researchers cast from a different mold. All three professors play and perform music, and have throughout their academic careers.

The typical research professor juggles a schedule that involves any number of meetings and seminars, managing a research lab full of students, applying for grants, conducting experiments that seemingly leave time for little else.

Barbara Crowe, professor of music therapy at ASU, is not surprised that busy professors make time for music. "Music is a fundamental human behavior," she said.

Crowe also said that there is a "primal emotionality that goes into music," and that music has a strong genetic basis. She also noted that there is a strong association between the auditory nerve and the limbic system, which is a group of interconnected structures in the brain that mediate emotions, learning and memory.

Roberson, professor of cell biology, said that playing music is "all about whether you have something to communicate," and that "there are a lot of similarities between lecturing and playing [guitar]."

Roberson said that "it was the Beatles that inspired" him and his brother to take up the guitar in the 60s. He would have his mom write down the lyrics of the songs as he and his brother would listen and figure out the chord progression. Roberson had no formal musical training in high school or college, but has kept pursuing his love for music throughout his academic career. He enjoys reworking music that he grew up listening to, and describes playing music as "rejuvenating."

Local coffee shops and bars have lately been showcasing Roberson's solo concoctions. He enjoys putting together songs of his own that have been buzzing around his head for the last 30 years. Roberson credits his unique musical style to a diverse group of artists ranging from Neil Young to Philip Glass.

Betty Davidson, research professor of insect and amphibian pathology, has been singing with the Dayspring Chorale, which is one of several choirs at the Dayspring United Methodist Church, in Tempe since 1985. Singing in the choir has taken Davidson on several concert tours which involved traveling and performing in Germany, France, Italy, Austria and Switzerland.

Studying music was not something that Davidson was encouraged to do as a child, even though she was always singing as a young girl. When she started attending Dayspring United Methodist Church, and



singing with the choir, she found a fascinating contrast to life as a professor. Davidson said that the choir brings together people from many different backgrounds with experiences very different from her own. There she has been able to sing choral music dating from the American Revolution to modern African-American gospel with doctors, car salesmen, lawyers and more.

Davidson has also found some things in her musical training that transferred well to science. As a singer she has learned the importance of volume, tone and spacing which she has found applies not only to the communication of musical themes, but also to communication between colleagues and students. The artful use of pauses and space in lectures can make what might be a boring stream of words more entertaining and meaningful communication.

Ron Rutowski, professor of biology, likes to keep his fiddling expertise quiet. However, his skills are well known in the Valley since he plays a wide variety of styles including bluegrass, country and folk. It's also hard to keep quiet that he toured with the international recording artist Glen Campbell in the 90s.

This summer, Rutowski played with Igor's Jazz Cowboys at a jazz festival in Los Angeles. He also played in concerts with some local country rock bands and in recording sessions with local folk, country and gospel singer-songwriters. Rutowski's favorite type of concert is the kind where he gets to combine the different styles and sounds he's learned. He gets to do that in the local band Poor Alfred (www.pooralfred.com) which plays once a month at the Rio Salado Brewing Company.

For Rutowski, "the pattern of biology and music has always been there." He started playing in bands in high school and has never stopped. When asked why he continues to play music he said it was because it "takes a high level of concentration, and can be tremendously rejuvenating."

SOLS may be full of musically "rejuvenated" faculty like Roberson, Davidson, and Rutowski. Judging by the caliber of these professors, the school wouldn't suffer for it if there were a few more.



Campus Happenings

Great Courses

Maria Erspamer

In popular culture when car manufacturers want to re-release a "classic" product, they preserve the "look and feel" of the car while adding modern innovations in the interior and under the hood. The idea is to keep what was so intriguing about the original design while adding the lure of modern comforts. This methodology nods at our human tendency to gravitate towards the familiar, as well as our societal tendency to "keep up with the Joneses." It also parallels the reinvention of the BIO 187/188 General Biology for Majors, required classes for life and health related science majors at ASU.

How do you makeover a tried and true curriculum about biological concepts from organismal structure and function to physiology? Start with the instruction, says **Stanley Faeth**, professor and instructor of BIO 187. Faeth takes a personal approach to his teaching. "Rather than provide encyclopedic information, which has and will, change rapidly, students are trained to think as scientists, think by formulating hypotheses, making predictions, designing tests, collecting data and reaching conclusions." Critical thinking opportunities are infused throughout Faeth's semester offering which he feels key to helping students digest the basic concepts and simultaneously address biology as the vast and growing scientific discipline that it is.

SOLS lecturer **Delon Washo-Krupps** is teaching BIO 187/188 for the first time at ASU and has a similar approach. Washo-Krupps, who also teaches microbiology, anatomy and physiology at ASU, knows how important it is for life and health related science majors to get a solid general biology background. She uses Blackboard, the networked learning environment used at ASU, to post skeleton class notes so that during lecture students can focus on what she is teaching rather than writing frantically.

Both Faeth and Washo-Krupps use the Classroom Performance System (CPS), which uses a hand held remote to collect student answers during class. The technology is used to help students

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assess their progress, as well as reinforce concepts introduced throughout the semester. "CPS is especially useful for actively engaging students in lecture, and assessing how well they understand the material," said Washo-Krupps. Faeth agrees and adds, "It [CPS] allows students to participate in the thinking aspect of the class by participating in planned scientific and biological exercises."

"The implementation of the CPS system was made possible by a grant from the College of Liberal Arts and Sciences," says **Charles Kazilek**, director of technology integration & outreach and grant co-writer. He says that the use of CPS in SOLS classrooms "was enough of a success to be adopted by the entire university."

The CPS system has been in use university-wide since the fall of 2004, but SOLS has been experimenting with this type of technology for the past five years. The CPS system and its predecessor, the Personal Response System (PRS), initially used infrared (IR) technology and a hand held pad or remote to gather students' responses. Radio frequency is more efficient and cost effective than the less reliable IR technology.

Kazilek added, "We want to standardize on one pad that students can purchase and keep for their academic career." This interest has led to further developments in the system, which falls in line with Faeth and Washo-Krupps's critical thinking model. According to Kazilek, a professor can simply add questions to their existing power point lectures and engage the class with CPS when required.

When asked about the greatest benefit of CPS in a large lecture, Kazilek said, "Students in large classes can participate in an engaging manner." He said students "can feel comfortable answering questions knowing that their answer is not going to be broadcast to the entire class." This allows students "to learn by making mistakes"

The hands-on and critical thinking component of CPS in BIO 187/188 are carried over into the lab, which has also been recently revamped. The transformation began during the spring 2005 semester, when SOLS professor **Jim Collins** augmented and improved some of the laboratory exercises in BIO 187. **Faye Farmer**, lab coordinator of BIO 187/188, said that Collins sat in on labs and teaching assistant meetings in order to integrate evolution and modeling into laboratory exercises. She says, "We also assessed individual students that semester. We gauged their understanding of the material and assessed the methods and approaches used during the laboratory exercise itself."

As a result, Collins included a program called "Populus" in the curriculum, which is available from the University of Minnesota and examines models of evolution. The adoption of Populus in the classroom led to further interest in reworking the labs. Collins partnered with Farmer, and

librarian **Katherine O'Clair** to submit a proposal to integrate technology into the lab. Farmer, who is the primary investigator on the proposal, said that they were successful in getting funding and have been able to purchase several new pieces of equipment and design new curriculum.

O'Clair and Farmer also created an ASU Libraries 187/188 partnership in order to teach students the library skills they need to be future researchers. O'Clair said, "Rather than having students come to the library and listen to a presentation on all the features of the library, we are having them jump right in and start using the resources and tools the library has to offer." By the time students have completed both semesters of BIO 187/188, they have worked with several facets of scientific literature.

Obviously, all parties are moving forward in developing ways for making the General Biology for Majors curriculum a sleek, modern offering with classic sensibilities.



Seminar Information

SOLS Seminars are held in LSE 104 on Fridays from 2 p.m. until 3 p.m.

November 4 Richard Prum, Department of Ecology and Evolutionary Biology & Peabody Museum of Natural History Yale University, Host: Kevin McGraw

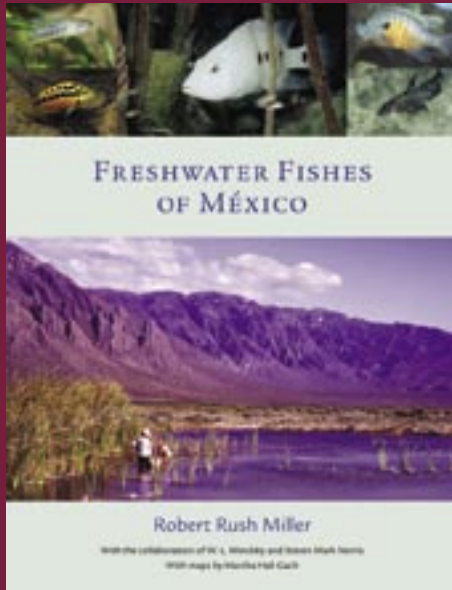
November 18 Kuan-Teh Jeang, Molecular Biology Lab, NIH, Title: "Interactions between retrovirus and the cell: new insights from HIV-1 and HTLV-1", Hosts: Bert Jacobs & Karen Kibler

December 2 Michael Dickinson, Cal Tech, Title: "How Flies Fly", Hosts: SOLS Grads

Advising Information

November 3 Senior Reception 4:00 p.m.
Life Sciences C Wing Lobby

December 15 Fall Commencement 10 a.m.



Book Reviews

Book Ensures Minckley Legacy

David Brown

W.L. Minckley or “Minck,” as he was known by his colleagues was ASU’s premier fish biologist, whose untiring efforts made Arizonans conscious of their state’s native fish heritage. And, it is no small measure of his professionalism that that he postponed work on his own *magnum opus* on the fishes of the Southwest to help bring the work of another author to fruition. Knowing that his ailing colleague and mentor, Robert Rush Miller, would be unable to complete his life-long work on the native fishes of Mexico, Minckley spent the final year of his own life working on taxonomic keys, drafting species descriptions and distribution maps, and arranging for the illustrations of the numerous fishes, while contributing important chapters on Mexico’s ecology and biogeography. When Minck passed away from complications due to cancer, on June 22, 2001, it was with the knowledge that enough of the book had been completed to ensure publication.

This November, the University of Chicago Press will publish Robert Rush Miller’s 544 page “*Freshwater Fishes of Mexico*” an 8 1/2 x 11” encyclopedia-like compendium identifying and describing the more than 500 fishes native to Mexico. Each species account is accompanied by a detailed distribution map, drawing or photographs, and a discussion of the fish’s habitat, evolutionary history, and conservation status. The species accounts are organized by family and supplemented with color galleries of photographs of live fishes in their natural habitats. They are also supplemented with discussions of Mexico’s biogeography, aquatic resources, and biodiversity. Moreover, the book offers a historical overview of the discoveries and contributions made by the small group of dedicated ichthyologists who have made Mexico the focus of their research for more than two centuries.

This work is an enormous accomplishment. Although Mexico is only one-fifth the size of the continental United States, it contains more than two-thirds of the continent’s freshwater fishes—a diversity attributable to that country’s enormous range in elevation from below sea level to volcanoes topping out at altitudes of more than 16,000 feet. This book is particularly valuable to Arizonans because an understanding of Mexico’s biota is essential for any comprehensive understanding of the fishes found in Arizona. It is for this reason, that both Miller and Minckley spent so much time in Mexico and knew its people so well. The cover of the book is a scene from Cuatro Ciénegas, the study area in Coahuila first visited by Minckley as a graduate student, which is an area that he loved and labored diligently to preserve, even up to the time of his death.

The publication of a respected reference book such as this one, represents the acme of academic achievement. This book is a fitting tribute, not only to Robert Rush Miller, but to the two major contributors—Steven Mark Norris and W. L. Minckley. Through their work and dedication, the legacy of all three is preserved to the benefit of us all.

Beetlemania

Kate Ihle



A new book, *A Field Guide to the Tiger Beetles of the United States and Canada: Identification, Natural History and Distribution of the Cicindelidae*, is the latest addition to the series of field guides authored by School of Life Sciences professor **David Pearson**. The book was also co-written by C. Barry Knisley and **Charles Kazilek**, director of technology integration & outreach. The guide contains information on all 107 species of tiger beetle that are known to occur in the United States and Canada. With dichotomous keys, natural history, distribution guides and full color pictures, *A Field Guide to the Tiger Beetles of the United States and Canada* is an excellent resource for both the expert and novice collector of tiger beetles.

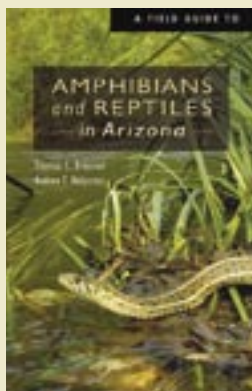
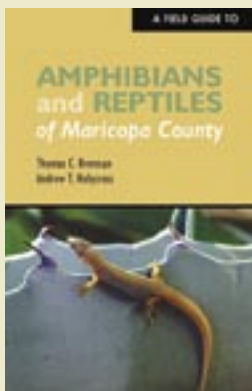
The guide contains keys that can be used to identify the species of adult beetles. Accompanying keys contain detailed drawings of the identifying morphological features that complement the descriptions.

Following the keys, is an extensive section containing the natural history of each species of tiger beetle found in the United States and Canada. Using data collected by fellow tiger beetle enthusiasts and drawing heavily from the tiger beetle journal *Cicindela*, the authors have compiled information on the geographical range, subspecies, habitats and behavior of

the tiger beetles of the United States and Canada. The range of each species is illustrated with a shaded map at the head of each section. The authors also describe other tiger beetle species that are found in the range and make useful distinctions between them.

The detailed descriptions of each species are complemented by full color plates found at the back of the guide. The color images of the beetles are the work of Charles Kazilek. He modified digital images of each beetle to create a life-like model specimen in a process that Pearson referred to as "painting with pixels". The result is an easy-to-use identification guide for the novice collector unfamiliar with the more traditional dichotomous keys found at the beginning of the book.

Tiger beetles are a diverse family of insects found worldwide. Their abundance and beautiful coloration are making them an increasingly popular object for collectors and an emerging group of "insect watchers." Pearson, Knisley and Kazilek have managed to convey their excitement about tiger beetles in *A Field Guide to the Tiger Beetles of the United States and Canada* by providing an informative and visually pleasing introduction to tiger beetles for novices, and a exhaustive yet concise key to the species for experienced tiger beetle enthusiasts.



Additional Publications

A Field Guide to Amphibians and Reptiles of Maricopa County by **Andrew T. Holycross** and **Thomas C. Brennan** was published in April 2005. This beautifully illustrated guide is a collaborative effort between the Arizona Game and Fish Department (AGFD) and ASU. The book includes all 82 species of amphibians and reptiles found in Maricopa County. The publication is a practical tool for both frequent wildlife watchers and for those who just encounter snakes and lizards outside every once in a while. It is the first of two educational public outreach guides being produced within SOLS. The second joint project is entitled *A Field Guide to Amphibians and Reptiles in Arizona* and is to be published in spring of 2006 by AGFD. It is fully illustrated and 68 pages in length. The guide costs \$5. You can order a copy of the guide on the Web site <http://www.azgfd.gov> or pick one up at any Arizona Game and Fish office in the state. Valley offices are located at 2222 W. Greenway Road in Phoenix and 7200 E. University Drive in Mesa.



Introducing the faculty and administration office

Starting from left to right:

Nicole Barr
Nancy Lesko (Manager)
Rita Yorly
Janice Frangella

Recognitions

Awards

Roy Curtiss III, co-director of the Center for Infectious Diseases and Vaccinology in the Biodesign Institute and School of Life Sciences Professor, received a \$14.8 million Grand Challenges in Global Health grant to improve a vaccine against bacterial pneumonia.

Kevin McGraw, professor, received two outstanding new investigator awards from scientific societies: The Animal Behavior Society and the American Ornithologists' Union.

George Poste, director of the Biodesign Institute and Distinguished Professor of Biology in the School of Life Sciences, was named Bioscience Leader of the Year by the Arizona BioIndustry Association.

Bert Hölldobler: A documentary film based on Bert Hölldobler's research, "Ants - Nature's Secret Power", has won several major awards including the most recent 2005 Jackson Hole Wildlife Film Festival's Special Jury Prize. The awards from this festival are considered the "academy awards" of documentary wildlife films.

Elizabeth Davidson, research professor, received the Alumni Achievement Award from her undergraduate college, Mt. Union College in Ohio.

The NSF-sponsored IGERT (Integrative Graduate Education and Research Training) program in Urban Ecology was funded

for a second five-year period beginning this fall. This \$3.2 million project will support approximately 20 graduate fellows from six disciplinary units. **Stuart Fisher**, **Ann Kinzig** and **Nancy Grimm** of SOLS are among 8 Co-PIs on the project co-directed by Fisher and Charles Redman of the International Institute for Sustainability, formerly the center for Environmental Studies.

Kevin E. McCluney, graduate student, has recently been awarded an EPA STAR fellowship: <http://tinyurl.com/cmcdlb>. The fellowship provides 3 years of support: paying tuition, a stipend, and a yearly expense account for research.

Nancy Grimm was elected President of the Ecological Society of America (ESA), a society of >9000 international members that is the premier ecological organization of the United States. Grimm is Professor in the School of Life Sciences and is lead Principal Investigator on ASU's National Science Foundation-funded Central Arizona-Phoenix Long-Term Ecological Research (CAP LTER) project, a study of the ecology of metropolitan Phoenix and surrounding agricultural and desert lands. Her research includes studies of the biogeochemistry of streams and riparian zones and the ecology of urban ecosystems. Grimm served for one year as President-Elect and assumed the one-year presidency in August, 2005, at the ESA Annual Meeting in Montreal, Quebec. Previously, she was elected President of the North American Benthological Society

(1999-2000), a smaller (~1500 members) society representing primarily stream ecologists. Grimm is an ASU graduate, having earned both M.S. and Ph.D. degrees from the former Department of Zoology at ASU.

John M. Briggs, professor of ecology, evolution and environmental science, has been awarded a Charles Bullard Fellowship from Harvard University. This fellowship is to "is to support advanced research and study by persons, either scholars or administrators, to forestry defined in its broadest sense as the human use of forested environments". He will be stationed at the Harvard Forest (a Long Term Ecological Research site) in Petersham, MA from July 2005 to June 2006. In addition, he has recently received a grant from the Long Term Ecological Research Network to conduct a cross-site synthesis of the patterns, mechanisms and consequences of shrub expansion and dynamics into grasslands. He will also use this time to finish a book (The Biology of Grasslands; Oxford University Press, Biology of Habitat Series) that he has recently started with Drs. Alan K. Knapp (Colorado State University) and Scott L. Collins (University of New Mexico). This book will be a major synthesis of grassland ecology.

At the recent Multimedia Educational Resource for Learning and Online Teaching (MERLOT) International Conference in Nashville, **Charles Kazilek**, director of technology integration & outreach; Gene Valentine, professor emeritus of English; and Jennifer Tsukayama, assistant professor of dance, were recognized and honored for their excellent contribution to digital scholarship. Their module, "The Paper Project," was selected as the 2005 Classics Award winner for Teacher Education. The program recognizes and promotes outstanding online resources designed to enhance teaching and learning, and to honor the authors and developers of these resources for their contributions to the academic community.

CLAS Undergraduate Classroom Improvement Grant Recipients (Fall 2005):

- Faye Farmer, Katherine Clemens (O'Clair), and James Collins "Molecular Identification of Diversity within Centers of Origin of Agricultural Products and Ethical Implications of Genetically Modified Crops"
- Tsafir Mor, Valerie Stout, and Willem Vermaas "Purchase of Alphamager Gel Imaging System for Undergraduate Laboratories in SOLS."

Appointments

Andrew Webber, professor within the Cellular & Molecular Biosciences Faculty, has been appointed Associate Dean of Graduate Student Services, Division of Graduate Studies

Elena Ortiz-Banay, who recently received her Ph.D. working with Juliet Stromberg, professor within the Ecology, Evolution, & Environmental Science Faculty, is currently tenure track at Phoenix College teaching environmental science and natural history.

Transitions

Welcome SOLS New Hires!

Organismal, Integrative & Systems Biology Faculty

Juergen Gadau, Assistant Professor
Kevin McGraw, Assistant Professor
Sharon Crook, Assistant Professor
Brian H. Smith, Professor
Gro Arndam, Assistant Professor
Juergen Liebig, Assistant Professor

Ecology, Evolution & Environmental Science Faculty

Anarias Escalante, Associate Professor
Susanne Neuer, Associate Professor
Sharon Hall, Assistant Professor

Cellular & Molecular Biosciences Faculty

Junn-Liang Chen, Assistant Professor
Josephine Clark-Curtiss, Professor
Roy Curtiss III, Professor

Human Dimensions of Biology Faculty

Daniel Sarewitz, Professor

Biomedicine & Biotechnology Faculty

Shelley Haydel, Assistant Professor
Stephen Johnston, Professor
Kathryn Sykes, Assistant Professor
Larry Mandarino, Professor

Lecturer

Delon Washo-Krupps

Retirements

Jack (Martin J.) Fouquette, Professor-Emeritus, Ecology, Evolution, & Environmental Science Faculty, 1965 - 2005

Jean Schmidt, Professor-Emeritus, Ecology, Evolution, & Environmental Science Faculty, 1966 - 2005

William Sharp, Research Professional, Sr., Laboratory manager of the Life Sciences Electron Microscope Facility, 1978 - Dec 2005

ASU School of Life Sciences Newsletter

Yesterday



Courtesy University Archives Arizona State University Libraries circa 1961



Friday morning, October 14, 2005

Today

Contact us!

If you have information to include in this newsletter, please contact us at SOLS@asu.edu. We are particularly interested in reconnecting with Alumni and Emeriti. Manuscripts should be less than 1000 words, photos should be high resolution, and all submissions should include all pertinent contact information. Submissions should be sent to David Brown, Editor; David.E.Brown@asu.edu or Faye Farmer, Managing Editor; Faye.Farmer@asu.edu, attention SOLS Newsletter; P.O. Box 874501, Tempe, Arizona, 85287-4501. We reserve the right to edit all submissions

Newsletter Sta

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