



NEWSLETTER

Southwestern Research Station

Portal, Arizona

Center for
Biodiversity
and
Conservation and
AMERICAN MUSEUM OF NATURAL HISTORY

Number 25

Year 2010

From the Director

Dawn S. Wilson

Improvements in Infrastructure

In the past seven years, the Southwestern Research Station (SWRS) has made significant advances in upgrading the station's infrastructure. Improvements thus far have provided scientists and students with better quality working environments and equipment. This year, I am pleased to report that we will continue to move forward with additional infrastructure upgrades that will provide more housing options for station users and will upgrade our cyber-infrastructure to promote collaborations among both scientists and educators. Our specific goals include:

- Construction of student dormitories to provide affordable housing and increase space available to scientists and course participants.
- Renovation of older housing units to provide safer, more comfortable housing to senior scientists and scientists that bring their families to the station.
- Replacement of aging, animal holding pens that are used to temporarily house animals in ambient conditions until their use in scientific projects.
- Development of a Database Management System for archiving and providing access to historical and current data sets, aiding in facilitating future field research, and helping scientists pursue questions that involve change through time.
- Improvement of scientific collections of plants and animals housed at the SWRS by upgrading cabinets and making the collections digitally available to the broader community.

Research and Education

Those of you reading this newsletter already appreciate the fact that the SWRS is located in one of the most biologically diverse areas in the United States,

encompassing some of the highest biodiversity of plants and animals in the world. Reptiles and

amphibians contribute prominently to this diversity. For example, the southwest has the world's largest rattlesnake diversity and some of the most rare and threatened frog



Black-tailed Rattlesnake, *Crotalus molossus*; Photo by D. S. Wilson

species. Drought and use of water resources, habitat destruction, and the introduction of non-native species are some of the threats facing herpetofaunal diversity in Arizona and neighboring states.

Continuing our role as a leader in offering a diversity of educational courses and workshops, we will introduce a newly developed course – Field Herpetology of the Southwest – to be held from 24 July to 3 August, 2011. For more information, see our ad on page eight of this newsletter.

Our Chiricahua Leopard Frog head-starting project has grown from 19 tadpoles to 29 adult frogs. This past



Frog enclosure; Photo by D. S. Wilson

summer we completed the construction of two outdoor enclosures, each containing a pool, plants, and basking sites. We will be keeping our eyes open for egg masses that we anticipate our adult

frogs will lay in the enclosed pools this spring.

The Southwestern Research Station

The research station is a non-profit organization under the direction of the Center for Biodiversity and Conservation at the American Museum of Natural History (AMNH), New York.

The SWRS enhances AMNH's diversity and strengths by providing scientists and educators from the museum, other institutions, and around the world the opportunity to participate in research, workshops, and classes in one of the most biologically rich environments in the United States.

Staff:

Dawn S. Wilson, Director
Geoff Bender, Operations Manager/Budget Officer
Barbara Roth, Bookkeeper
Tresa Glore, Office Manager; Intern Coordinator
P.D. Hulce, Chief Maintenance
Jodi Kessler, Kitchen Manager/Head Cook
Chris Pope, Seasonal Cook
Juvy McEwan, Kitchen Assistant
Leesa Bunts, Head Housekeeper
Beatrice Lopez-Falcum, Housekeeper
Lorraine Titus, Gift Shop Clerk
John Jones, Gift Shop Clerk

Contact Information:

P.O. Box 16553, Portal, Arizona 85632
Phone: 520-558-2396; Fax: 520-558-2018
E-Mail: swrs@amnh.org
Web: <http://research.amnh.org/swrs/>



RESEARCH



2010 SCIENTISTS

Scientists that come to the SWRS study a wide diversity of organisms in the surrounding forest and desert habitats. The proportions of flora and fauna that scientists studied in projects this past year were as follows: 40% invertebrates, 17% plants, 15% birds, 11% amphibians, 11% reptiles, and 6% mammals.

Many of the scientists that conduct research at the SWRS rely on student interns to assist them in their field work. The SWRS would like to extend a huge THANKS! to these interns for their participation in

field research and for their assistance in keeping the station running each season.

Agard, Christopher. Howard Univ., Washington, D.C. Effects of caudal autotomy on sympatric *Sceloporus* species.

Barton, Andrew. Univ. of Maine, Farmington. The role of re-sprouting in the recovery of chiricahua pine from a high severity wildfire.

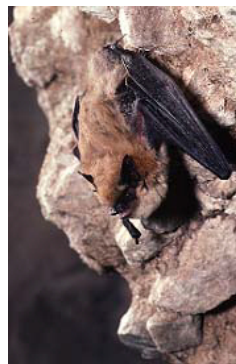
Bernard, Gary. Univ. of Washington, Federal Way. Far red vision of Metal-Mark butterflies and close relatives.



Boersma, Kate. Oregon State Univ., Corvallis. Effects of predator presence/absence on colonization of novel habitats.

Brown, Tracey. California State Univ., San Marcos. Digestive physiology of Texas horned lizards.

Cahan, Sara Helms. Univ. of Vermont, Burlington. Genetic architecture of reproductive caste in harvester ants.



Campbell, Polly. Univ. of Arizona, Tucson. *Myotis californicus* and *M. ciliolabrum*: a single polymorphic species or two very young species?

Corcoran, Aaron. Wake Forest Univ., Winston Salem, N.C. Sonar jamming in the bat-moth arms race.

Egan, Scott. Univ. of Notre Dame, IN. Population genetics of frugivorous flies (*Ragoletis cingulata*) species group.

Gordon, Deborah. Stanford Univ., CA. Harvester ants: function of chemical signals; genetic analysis of microsatellite variation to determine relatedness.

Greene, Michael. Univ. of Colorado, Denver. Social interaction dynamics of harvester ants.

Ignace, Danielle. Univ. of Arizona., Tucson. Community change in an arid ecosystem.

Jablonski, Piotr. Seoul National Univ., Korea. Responses of insects to robotic displays imitating Mockingbird wing flashing.

Johnson, Christine. Amer. Mus. Nat'l Hist., New York, NY. Behavioral ecology of *Polyergus breviceps*.

Kay, Adam. Univ. of St. Thomas, St. Paul, MN. Nutritional constraints on ant colony foundation.

Kureck, Ilka. LMU Munich, Germany. Internal conflicts, dispersal, and the consequences of inbreeding on an ant with alternative reproductive tactics.

Leichty, Aaron. Univ. of North Carolina, Chapel Hill. The genetic basis of adaptive carnivory in spadefoot toad tadpoles.

Malusa, Jim. Univ. of Arizona, Tucson. Field verification of firescape fuel models.

Martin, Ryan. Univ. of North Carolina, Chapel Hill. Do resource polymorphism and character displacement shape community structure?

Neuman, Antje. LMU, Munich, Germany. Competition over the help of workers – a conflict among intermorphic queens in the ant *Hypoponera opacior*.

Nguyen, Tam. Amer. Mus. Nat'l Hist., New York, NY. Spittlebug flies in the southwest.

Paull, Jeff. Univ. of North Carolina, Chapel Hill. Ontogenetic niche shifts under frequency dependent processes.

Pfennig, David. Univ. of North Carolina, Chapel Hill. Evolution and development of character displacement in spadefoot toads.

Pfennig, Karin. Univ. of North Carolina, Chapel Hill. Hybridization and sexual selection in spadefoot toads.

Pinter-Wollman, Noa. Stanford Univ., CA. Correlated behaviors in harvester ant colonies.



Reed, Jay. Univ. of Michigan, Ann Arbor. Functional significance of mite pockets in the lizard *Sceloporus jarrovi* and the effect of pockets on mite load and host stress.

Scales, Jeffrey. Univ. of Hawaii, Manoa, Honolulu. The evolution of the locomotor system in Phrynosomatid lizards.

Schmidt, Emily. Univ. of North Carolina, Chapel Hill. Reproductive character displacement in spadefoot toads.

Scott, Clare. Univ. of Florida, Gainesville. The phylogeny of the genus *Lycomorpha* and the subtribe Cisthenina (Lepidoptera: Noctuidae).

Sherbrooke, Wade. Amer. Mus. Nat'l Hist., New York, NY. Horned lizard anti-predator behaviors.

Seal, John. Univ. of Texas, Austin. Physiological constraints of symbiont switching.

Sloane, Sarah. Univ. of Maine, Farmington. The role of male and female bushtits in nest building.

Sturgis, Shelby. Stanford Univ., CA. The role of midden in early and onset foraging in the seed harvester ant *Pogonomyrmex barbatus*.

Swanson, David. Univ. of South Dakota, Vermillion. Altitude effects on metabolic rates in small birds.

Unckless, Robert. Univ. of Rochester, NY. Endosymbionts and parasites of *Drosophila innubila*.

Vea, Isabelle. Amer. Mus. Nat'l Hist., New York, NY. Scale insects in Arizona and New Mexico and their host plant relationships.

Weiss, Stacey. Univ. of Puget Sound, Tacoma, WA. The communication function of female striped plateau lizards' visual and chemical signals.

Woods, Art. Univ. of Montana, Missoula. Biophysics of plant-insect interactions.

Check out our web site for information on courses and workshops offered at the SWRS!!
<http://research.amnh.org/swrs>

For a color version of this newsletter, please visit our website and click on Researcher then Publications

2010 FEATURED SCIENTIST

Deborah M. Gordon, Ph.D

Stanford University

I first came to SWRS to study harvester ants (*Pogonomyrmex barbatus*) as a graduate student in the early 1980's, and I have been back almost every summer since. I began working at a site in the desert that I chose arbitrarily, near the Portal road. After a few years I realized that there were interesting changes in a harvester ant colony's behavior as it develops, and so I began to map and mark the same colonies every year. Since my first visits to the site, the land where I work has belonged to two different ranchers and eventually was purchased by Stanford University, making it possible to fence in the property so that research could continue despite development near the site. Each year, I have censused the population of about 300 colonies to find out which have survived since the previous year, which have died, and where new colonies are located. From this work I have learned that colonies live for about 25 years and by now I have come to know some of them really well.



Harvester ants carrying a seed to the nest.
Photo by Raymond A. Mendez

Each year we work as a group, including undergraduates, graduate students, postdocs, and other collaborators. We study how colonies operate without central control -- no ant gives directions or

instructions to any other ant. Instead colonies regulate their activity using interaction networks. An interaction is a brief antennal contact. Working with Mike Greene from the University of Colorado, Denver, my students and I have developed experiments using small chips coated with odors extracted from ants, and learned that when ants touch antennae each ant assesses the odor of the other. These odors, from the ant's cuticular hydrocarbons, identify the task of the ant, such as forager or nest maintenance worker. An ant's hydrocarbon profile changes because of the conditions of its work. Foragers spend more time outside the nest, and we found that exposure to heat and low humidity changes an ant's odor.

More recently, we have been studying how colonies regulate foraging activity. Interactions with foragers returning with food

stimulate foragers inside the nest to go out on the next foraging trip.

Harvester ants eat seeds, and most of a forager's trip is spent searching for food. So the rate of forager return is a measure of how much food is available: the more food available, the less time foragers spend searching, and the more quickly they come back to the nest. Also, we have found that colonies differ in how they regulate foraging activity, and we are now looking at whether the colonies that regulate this activity more closely have higher reproductive success. Working in collaboration with computer



Deborah (left) with students and coworkers



Deborah's study site near Portal, AZ

scientists, we are developing models of the algorithms ants use to regulate foraging in response to interactions.

I have written about the joys and tribulations of field work at SWRS in my book *Ants at Work* (Norton, 2000), and more recently about how ants use interaction rate in my book *Ant Encounters* (Princeton University Press, 2010).

EDUCATION

Tucson High Magnet School SANITY Program

By Margaret Wilch

Science and Nature in Tandem for Youth (SANITY) is a program for high school students that arose out of collaboration with the University of Arizona College of Science and Tucson High Magnet School. Outreach Coordinator Katrina Mangin and me, a Tucson High teacher, cooked up the idea during a series of informal meetings back in 2005, wherein we met over coffee, to discuss how to improve science education in public high schools. We arrived at the conclusion that students do not get outside in nature and do what biologists and geologists do, that they do not know the plants and animals of their environment or the natural history of Arizona. Additionally, our concern was that students were not getting the opportunity to participate in hands-on science in high school. How could students ever get hooked on science if all they did was textbook work and canned lab activities? Our solution was to transport a group of students and teachers out to a biological field station to explore the natural world together. Thus the SANITY program was born out of a very organic process with ideas coming directly from teachers at the high school, tailor made to meet the needs of our students. Funding came from the University of Arizona College of Science and Tucson High Magnet School for the first three years and now the program is run largely on tax credit donations and student fund raising with teachers being supported by THMS.



Students study invertebrates in Cave Creek

Research Station in Portal Arizona during the first week of June. The first three or four days are spent hiking and observing nature. Students are introduced to the Chiricahua Sky Islands and to field techniques that enable them to make observations and develop research questions. Students are then required to focus on a single question and design an experiment to answer that question, a concept based loosely on the Organization of Tropical Studies model used to instruct students on field research techniques. Students work in pairs and have two to three days to design and conduct their research project. At the end of the program, students present a short power point presentation of their work in the SWRS conference room and create a poster for a poster session back at the high school in Tucson.



Birding at the SWRS



Birthday celebration

The beauty of staying at the research station, aside from its beautiful location, accommodations and fabulous food, is that students and teachers get to mingle with biologists and researchers, both local residents and others from around the country. Many times the students have worked with research scientists on their research at the station.

The program empowers the students to think like scientists but it also empowers the teachers who participate. SANITY allows teachers and students to interact in a more relaxed and collaborative manner than is normally allowed during the academic school year. Teachers have commented that it has been a great professional development opportunity and that the experience has changed the way they teach. Tucson High Magnet School is the oldest high school in the state of Arizona. It is also one of the largest with an enrollment of just over

3000 students. The majority of students at THMS, (71%) are Hispanic or other ethnicities that are under represented in

the sciences. To remedy this, Tucson High Magnet School started a research program called Honors Research Methods in 1995. Students in the program work on independent research for the entire academic year and enter their work in regional and state science and engineering fairs. Ultimately the goal of the SANITY program was to support this program by creating a scientific community at the high school and encouraging students to engage in scientific research. Since the program started five years ago, well over half of all the SANITY participants have gone into the research program and many are now attending colleges and universities wherein they are continuing to do research as undergraduates. I believe that the program is definitely changing students' lives and making an impact on their futures.

STUDENT INTERN AND VOLUNTEER PROGRAM

Approximately 30 positions are available for the 2011 season.

1. Student Intern, *Research Season*: March – Oct. This program offers students in biological sciences outstanding opportunities to observe and work with scientists conducting field research. Food and lodging are provided in exchange for 24 hours per week of routine chores, with remaining time available for research activities.



Recently reestablished Gould's Turkey
Photo by volunteer, Bob Weaver

2. Volunteer, *Naturalist Season*: Fall and Spring, This program offers individuals the opportunity to enjoy all the wonders of the Chiricahua Mountains. Just a few minutes walk from the station are hiking trails, creeks, and birding areas matched no where else in the United States. Food and lodging are provided to volunteers in exchange for 24 hours per week of routine chores, with the remaining time available for personal activities.

For more details on these positions, please visit our website or contact: Tresa Glore, SWRS, P.O. Box 16553, Portal, AZ 85632 USA; 520-558-2396; tglore@amnh.org

2010 INTERNS AND VOLUNTEERS

This past year, the station hosted 28 volunteers and student interns. They assisted scientists with their projects, helped build a new outdoor enclosure for

head-starting frogs, and worked with staff on daily maintenance and housekeeping chores. We thank them for their efforts and wish them well in their future endeavors.

Argentina: Andres Roubicek; **Belgium:** Elizabeth Versailles; **England:** Kerry Edwards, Kim Mullins, Bethany Walker; **France:** Clara Malouines; **Mexico:** Maria del Rocio Meneses Ramirez, Laura Edith Nunez Rosas; **South Africa:** Kim Watermeyer; **United States:** Chris Agard, Marissa Altmann, Benjamin Boatwright, Ellen Cantor, Daniel Estabrooks, Sharon Flesch, Adeline Harris, Eliza Hudson, Antoinette Johnson, Mollie Lyne, Jeff Martin, Kevin Moses, Caesar Rahman, Carla Robinson, Mary Jennifer Truini, Alexander Wade, Bob Weaver, Edward Weigand, Anne Williams.

THANKS TO OUR FRIENDS OF THE SOUTHWESTERN RESEARCH STATION

We would like to thank the following individuals for their support of the station in 2010. Your donations help us subsidize student researchers and support educational programs at the station.

AST Foundation, Stu Abraham, Ronald Albiani, Beyond Adobe, Keith Becker, Karen Biglin, Rene & Delane Blondeau, William Boggs, Rock Comstock, Bill Cooper, Lynn Crew, Michael & Jessie Cyr, Maryann Danielson, Heidi Dobson, Carell & Martin Ebert, David Elwonger, Drake & Kim Franklin, David Friend, Jean Gill, Arnie & Jennie Gooder, Debra Hargraves, Henry Hesperheide, Alan & Lucy Hinman, Don Hollister, Kenneth Davis & Elaine Hsu, Piotr Jablonski, Tom Jackson, Rudolf & Ursula Jander, Gary Kinsley, Bonnie Bowen & Rolf Koford, Larry Barello & Leigh Krueger, Nancy Lauver, John & Nancy LeGates, Mr. & Mrs. David Lunt, Bruce McIntosh, Ray & Joy Mendez, Hal & Pat Michael, Guy Miller, Laura & Bill Mullen, Nicholas Paizis, Gail Peterson, Ron & Barbara Quinn, Moria Robinson, Bobbie & Kristin Roth, Ruth & Marvin Shilling, Steven Stiffler, Kristine Stone, Paul & Marie Stone, Carol Simon & Howard Topoff, Jim Versteeg, David Wagner, Peter & Mary Sue Waser, Robert Winston.

BECOME A FRIEND OF THE SOUTHWESTERN RESEARCH STATION!

The SWRS provides scientists, educators, and students from across the country and around the world the opportunity to participate in research, workshops, and classes in one of the most biologically rich environments in the United States.

Your generous support plays a vital role in enabling us to maintain our programs and facilities. With your help in 2010, we recently: developed a new course, Field Herpetology of the Southwest, built an indoor head-starting facility and two outdoor enclosures for Chiricahua Leopard Frogs, awarded subsidies to eight undergraduate and graduate students so that they could conduct research at the SWRS, and provided educational books to a middle school class that came to the SWRS to learn about the ecology of the area.

Your tax-deductible gift helps us advance both our research and educational objectives at the SWRS by enhancing our technology infrastructure, becoming a “green” model for the surrounding community, and providing students the opportunity to gain valuable research experience.

*** Please contact Dawn Wilson (520-558-2396; dwilson@amnh.org) for more information about contributing to the New Dormitory Building Challenge or about naming opportunities for future “Green” Buildings ***

Thank you for supporting the Southwestern Research Station!

Please accept my tax-deductible gift in the amount of:

\$25 \$50 \$100 \$250 \$500 \$1000 Other \$ _____

I enclose a check for \$ _____ made payable to: SWRS

I authorize a debit to my Visa/MasterCard/Discover in the amount of \$ _____

CARD NUMBER

EXPIRATION DATE

SIGNATURE

NAME

MAILING ADDRESS

PHONE NUMBER

EMAIL (optional)

(Please print clearly using block letters)

All Supporters of the SWRS Receive Our Annual Newsletter and Email Updates.

Please cut at the dotted line and return with your contribution to SWRS, P.O. Box 16553, Portal, AZ 85632 or via fax to 520-558-2018.

SOUTHWESTERN RESEARCH STATION
P.O. Box 16553
Portal, AZ 85632

Please forward, and notify sender
of change of address.

Southwestern Research Station Newsletter New Course! Field Herpetology of the Southwest

The SWRS is pleased to announce a new course to be offered 24 July – 3 August 2011. During this 10-day course, participants will gain knowledge on the outstanding biodiversity of amphibians and reptiles found in a wide diversity of habitats throughout southeastern Arizona and parts of southwestern New Mexico.

Participants will work with experienced herpetologists to obtain hands-on experience in amphibian and reptile identification, collecting and marking techniques, and data documentation. The course also will cover specimen preparation of a full museum voucher specimen, including tissue vouchers and photographs.



Arizona Mountain Kingsnake
Lampropeltis pyromelana



Sonoran Desert Toad
Bufo alvarius

For more information about the course contact Dawn Wilson
Ph: 520-558-2396; Email: dwilson@amnh.org
<http://research.amnh.org/swrs/herpetology-field-course>

