

Cedar Point Biological Station News

A newsletter for Friends and Alumni of CPBS

Spring 2008



Directors Message

This is the first newsletter in a long time and I am glad to say that Cedar Point is still going great. I succeeded Al Kamil as director in 2005. I have been a faculty member in the School of Biological Sciences since 1999 and I have worked at many field stations across the US in the last 20 years. My work focuses on ecology at the population, community and ecosystem level. I have been involved with a number of projects looking at the impacts of elevated CO₂ on the functioning of plant communities, carbon sequestration in corn fields, oak masting and plant succession in abandoned agricultural fields. I also set up a new experiment at Cedar Point last summer. This new experiment is replicated in more than 40 sites worldwide and is designed to address questions examining which nutrient limits productivity and if plant community diversity responds to changes in nutrient availability. Check <http://web.science.oregonstate.edu/~seabloom/utnet/> for details and I will keep you posted as we go along over the next years.

Rob Anderson, the Associate Director for the past 5 years, has recently accepted a position as Director of Operations at Camp Catron in Nebraska City. Katie Potter will be the Interim Associate Director during the summer of 2008. As some things change, many things stay the same and our dedicated staff at Cedar Point, Kathy Bailey and Roy Bailey, still attend to the food and keep the station running. Currently, it looks that the enrollment for 2008 will be a substantial increase over the recent past, boding well for the future of our field station.

We might be making another transition away from our previous Girl Scout heritage. As many students might fondly remember the undergraduate bath houses have showers

installed at the appropriate height for girl scouts, which is not quite the appropriate height for UNL undergraduates. In January we got money allocated from the Vice Chancellor of Academic Affairs and we are currently planning to build a new bathroom building this fall. So, this summer will be the last undergraduate cohort to enjoy the old bathrooms and by next year we should have a nice setup of new bathrooms.

Jean Knops

Gainsforth Resource Center

Through the support of the National Science Foundation's Field Station and Marine Laboratory program and the University of Nebraska – Lincoln, the Gainsforth Resource Center was completed in 2002. The Gainsforth Center is the home to the library, computer lab, a second classroom, a conference room and a few offices. Having this additional building has really increased the flexibility and capabilities of the station. We now can run two courses concurrently. The building was named after the Gainsforth family, since their support over the years has been instrumental to the success of Cedar Point. In fact the station would not exist if not for the support of the Gainsforth family. The building was dedicated during a ceremony in 2003 with **Myrna and Stan Gainsforth** on hand to be honored.

Both the Gainsforth Center and the Goodall Lodge have wireless internet. The restrooms in the lodge have been completely remodeled. The lodge classroom and the resource center have air conditioning and the dining hall has an evaporative cooler. It is almost luxurious.

Staff

Director - Jean Knops

Interim Associate Director – Katie Potter

Facilities Manager - Roy Bailey

Head Cook/Facilities Assistant - Kathy Bailey

Courses

We will have an excellent offering of courses once again this summer. Courses will range from favorites like John Janovy Jr's Field Parasitology, to new courses like Devin Nickol's Field Epidemiology. Welcome back Devin. Paul Johnsgard will return to teach Ornithology, and Al Kamil will return along with post-doc Cynthia Wei to teach Field Animal Behavior. Several of the core courses for a degree in biology will be offered this summer. Guillermo Orti and Jean Knops will teach Ecology and Evolution. Matt Bolek, who got his PhD in the Janovy Lab and taught for us for the past two summers, will teach Organismic Biology. General Botany returns with Tom Elthon teaching it, and Limnology is back with John Holz at the helm. Check out our website for more information on courses and instructors.



Adrian M. Srb, J. Ve Srb and Edna I. and William H. Linder Fellowships

Over the past few years, the University of Nebraska foundation has been able to set up 3 new fellowships for Cedar Point students. Through the generous support of donors like **Jozzeta Srb** and **Greg Linder**, Cedar Point was able to award over \$15,000 worth of fellowship money to graduate and undergraduate students this past summer. These opportunities would not be possible without this support and we look forward to reviewing the next round of proposals for the coming summer. For more information on last summer's wide variety of research projects see the Research News.

RUTE Program

Since RUTE's inception in 2006, Cedar Point has been a field site for the NSF funded RUTE scholars program. This program teams two biology or natural resources students and two mathematics students with faculty from both disciplines. These teams explore ecological problems and use mathematical modeling in the process; bridging the disciplines together. For more information visit: <http://www.math.unl.edu/programs/rute/>

New Washhouse

This fall we plan to begin construction on a new washhouse facility. The new washhouse will have two sides, one for the male students and the other for the female students. Plans call for laundry facilities as well. It will be nice to have hot water, a decent height shower and good water pressure. The current washhouses will be converted into additional housing for teaching assistants or student researchers. This project is being funded by the UNL's Senior Vice Chancellor for Academic Affairs and the National Science Foundation's Field Station and Marine Laboratory program.

Prairie dogs at Cedar Point

A few years ago a small prairie dog colony established itself at Cedar Point. This was very exciting for the Cedar Point community. The next year it was poisoned without our consent and the town was wiped out. The town has come back and many species associated with a thriving town are now in residence, including burrowing owls.

Alumni News

Cedar Point alumnus **Jay Keasling** was named Scientist of the Year by the international science magazine Discover in 2006. Keasling was a student at Cedar Point in the mid 1980's. "My most memorable courses were the ones I took at the biological field station. John Janovy ran it then, and it was such a fun and exciting place. I spent the summer after my freshman year at Cedar Point. I took courses all that summer from John Janovy, John Lynch and Tony Joern. I took classes in field biology, and that changed my interests; I went to the university thinking I would go on to medical school, but that summer experience really convinced me to go into research." Jay is director of the Synthetic Biology Engineering Research Center at UC-Berkley, the first synthetic biology department in the country.

His lab is staffed with 50 post doctoral and graduate students. His research is funded by a \$42.6 million Gates Foundation grant that is developing a cure for malaria. He is also part of a group of scholars that received \$500 million from British Petroleum to create the Energy Biosciences Institute, which will be a world-class hub of research on biofuels and clean energy. Sources: Lincoln Journal Star, Nov. 14, 2006 / UNL feature story

Cedar Point Kid's Camps

Cedar Point has developed a new program for kids in the local area. Last summer Kristy Anderson taught four courses; each was a week long in the morning or afternoon. One course was about birds. John Faaborg (one of the big kids) spent a morning mist netting birds with the participants. Each of the children had the chance to hold and release one of the birds after it was banded. The smiles were big and excitement was high. Another course introduced the kids to the geology and herps of CPBS. It was a bit more challenging with the torrential rains, but we adapted and moved the geology hike to the weekend without Bob Diffendal. They also chased toads at Beckius pond, radio tracked turtles, hunted for lizards, handled live snakes and got to see a live rattlesnake from a safe distance. In our third course, the students made both plant and insect collections. They really embraced this and tried to find unique insects and plants for their collections. Our final class was about mammals and scientific processes. Students learned how to construct a pitfall trap and they set live traps as well. They got to learn the steps that scientists take in conducting their work. The children had a magnificent time and parents were thankful for the incredible opportunity. Who knows we may have recruited the next generation of great scientists.



Research News

Matt Bolek

Parasite life-cycles evolve as a result of both biotic and abiotic interactions over time. My research focuses on amphibians and their parasites for a number of reasons. First, amphibians spend a proportion of their life-cycle in aquatic ecosystems and the other portion of their life-cycle in terrestrial ecosystems. Second, among species, the proportion of time they spend in aquatic and terrestrial environments varies for each stage of the life cycle, and third, they have a diverse assemblage of parasites comprised of both phylogenetically related and unrelated groups as well as host specific and generalist species.

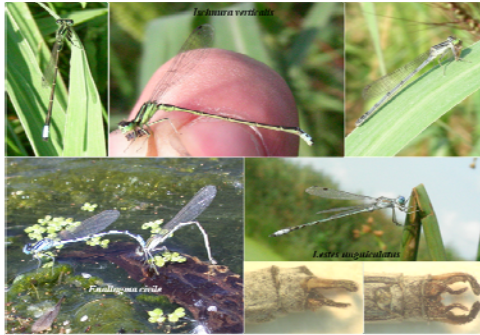


The aquatic North American bullfrog and semi-terrestrial northern leopard frog from Cedar Point Biological Station.

Our current NIH funded work is addressing how related forms of parasites (trematodes) interact with the innate immune system among distantly related insects. These parasites (frog lung flukes) have complex life cycles that utilize gastropods, aquatic arthropods, and amphibians as hosts in their life cycles. Our recent studies at Cedar Point Biological Station on frog lung fluke host specificity indicate that these parasites vary from being specialists to generalists in their arthropod hosts.

Molecular phylogenetic studies of these parasites suggests that these different patterns of host specificity may have arisen among parasites of Pangaeian arthropods and were conserved over evolutionary time as lineages of parasites were isolated from one another by continental drift. Therefore, this group of congeners that have a long evolutionary history with their hosts provide a system to explore parasite life-cycle evolution and arthropod innate immunity from an evolutionary perspective. This study will highlight the complexity of insect host-parasite relationships that involve the coevolution of

varied reciprocal cellular, molecular, and biochemical strategies.



Three different species of damselflies at Nevens Pond, Keith County, Nebraska.

Alaine K. Knipes and John Janovy

Identification of Blackspot Parasites: The Role of Nebraska Fish in the Transmission Ecology of a Parasite of Migratory Piscivorous Birds.

Blackspot infections caused by encysted larval trematode parasites are exceedingly common on minnows, chubs, carp, sunfish, and pikes in North America. Although blackspot is commonly assumed to be *Uvulifer ambloplitis*, there are actually a number of trematodes that cause black-pigmented cysts under the surface of the skin of fish and that use similar intermediate and definitive hosts. The correct identification to species is difficult because the encysted life stage of these parasites do not possess morphological characteristics sufficient for identification to species. New techniques, such as sequencing of rDNA, enable comparison of the parasites collected in and around Cedar Point with published data from other laboratories, thereby gaining accuracy in identification.

In July and August 2007, Largemouth Bass were collected from Dunwoody's pond, Bluegill Sunfish were collected from Humphrey's Pond, and Common Carp, Plains Killifish and Bluegill Sunfish were collected from the South Platte River at Roscoe, in Keith County, Nebraska. Extensive surveys of snails, the parasite intermediate hosts, were conducted at Dunwoody's Pond on August 4 and 9, 2007. One-hundred and thirteen snails were brought back to the laboratory, identified, and set out in jars to shed parasites. Those snails that were shedding parasites were isolated, and the types of parasites being shed were catalogued. A survey for snails was also conducted at Humphrey's pond on August 5, however no *Helisoma* snails were found.

Every summer for the past 30+ years, the Platte River sites and the ponds in Keith County have been the subject of CPBS Field Parasitology courses and the fish populations have been monitored for parasites. The definitive identification of the parasites at these field sites in Keith County, Nebraska will not only serve as an important resource for other studies working on North American fish and their parasites, but will clarify the role that Nebraska fish play in the transmission ecology of an exceedingly common group of parasites that mature in migratory piscivorous birds. This research was supported in part by funding from the Adrian M. Srb fellowship.

Gwen Bachman

Gwen began a new project on Ornate Box Turtles, *Terrapene ornata*, investigating energy dynamics. Specifically, how do activity patterns and reproduction affect the energy budget. These questions are important in understanding how a long lived individual will cope with climate change. Gwen spent last summer implanting temperature transponders to measure body temperature, radio tracking individual turtles, and measuring metabolic rates of the turtles in elaborate testing chambers.

Charles R. Brown - *Social Behavior, Coloniality and the Ecology of an Arbovirus in Cliff Swallows.*



Charles removing Cliff Swallows from mist net.

Charles Brown has been conducting a long-term study of ecological and evolutionary pressures responsible for group living in cliff swallows (*Petrochelidon pyrrhonota*) since 1982, a research program in its 27th year at Cedar Point. Primary questions are what factors drive the evolution of colonial nesting and why colonies vary in size. The research includes both long-term observational and experimental manipulations to assess key hypotheses. To date, over 180,000 cliff swallows have been banded and followed through at least part of their

lives. Comparative tests to examine issues associated with the evolution of coloniality are possible because swallow nesting colonies in the vicinity of Cedar Point range from 10 or fewer to 6000 nests. Previous work has demonstrated costs and benefits of coloniality, most of which vary systematically with group size. Current research involves study of phenotypic characteristics of individuals in different-size colonies as a measure of sorting among groups, and how transmission, maintenance, and the effects of a bird-associated, encephalitis-related arbovirus in cliff swallow ectoparasites varies with colony size.

Mary Bomberger Brown spent her first summer away from Cedar Point since the later part of the 1970's. She was missed, but we congratulate her on her new position as the Program Coordinator of the Tern and Plover Conservation Partnership of Nebraska. www.ternandplover.unl.edu

Kathy Keeler

In 1976 I marked 52 colonies of harvester ants (*Pogonomyrmex occidentalis*) above the station. I added a few more as they appeared during the next few years. I estimated a 30 year lifespan for the ants based on the death rate seen in the late 70's. More than 10 years ago I stopped adding new colonies but I continue to return to document the lifespan of those marked in '76-85. A few remain, 5 of them still alive after 32 years. I will continue to check on them at least until those 5 are no longer alive. These are believed to be single-queen colonies. <http://bsweb.unl.edu/emeriti/keeler/pogonomyrmex.html>

Svata Louda

My students and I work on the population effects and community consequences of invertebrate herbivory for plant growth, reproductive success, recruitment dynamics, density and spatial distribution, as well as the mechanisms underlying differential impact on individuals, populations and species within the plant community. The major thrust in our current work is on insect herbivory in the regeneration and persistence of native thistles, including sparse species with different life history strategies, and the role of insect herbivory in prairie plant community structure and dynamics.

We have long term demography plots established in the Sand Hills at both Arapaho Prairie in Arthur

County, Nebraska, and Niobrara Valley Preserve in Brown County, Nebraska. 2007 marked our 18th year of data collection on the demography of Platte and Wavyleaf thistles in these plots. These data are being used to model the life histories of these native thistles, as well as the effects of invasion of an introduced seed predator, *Rhinocyllus conicus*, on the growth and persistence of these plant populations. In addition, we have small scale experiments at Arapaho Prairie examining seed regeneration rates, how rodent and ant granivory affect rates of seedling establishment, and the role of seed limitation, nutrients and insect herbivory in the biodiversity of the Sand Hills prairie plant community.

Natalie West

My research focuses on how insect feeding and resource availability influence reproduction in two species of native thistle. Insects are well known to have drastic effects on seed availability in these plants. I am interested in how plants might compensate for seed losses to insects through changes in their flowering patterns over the course of a growing season.

This summer, I conducted several experiments on both wavyleaf thistle (*Cirsium undulatum*) and Platte thistle (*Cirsium canescens*) at Arapaho Prairie in Arthur County, Nebraska. Two of my main experiments involved damaging thistle flowers intentionally to see if plants would produce more flowers, or invest differently in flowers they had already produced. I also conducted experiments on pollen availability (would plants produce more seeds if I added pollen?), resource availability (would plants respond differently to damage if I watered them?), and the importance of the juvenile stage (will young plants protected from insects one year flower differently than their counterparts the next year?). I have also started a collaborative experiment with Dr. Svata Louda examining how seed predators, such as rodents and ants, affect the number of new thistle seedlings that are recruited in the next year. This research was supported in part by funding from the Adrian M. Srb fellowship.



Thistle flower at Arapaho Prairie.

Deidra Jacobsen

During summer 2006, I helped Dr. Svata Louda collect field data in demography plots in Arapaho Prairie in Arthur County as part of my year one UCARE (Undergraduate Creative and Research Experiences) project. I returned to Cedar Point and Arapaho Prairie during summer 2007 for year two of the UCARE program. I spent over 3 months collecting data on how Platte thistle (*Cirsium canescens*) density impacts insect herbivory, looking specifically at lace bugs (*Corythuca* sp.) and their potential role in spreading a fungus (*Stagonospora cirsii*) to the thistle. I am also interested in how insect damage affects the growth and survival of the plant. I found areas where juvenile Platte thistle were growing at varying densities and monitored them every two weeks, recording size and insect damage for each plant. I sprayed half my plants with fungicide and half with water. I will present a poster on this project at the UNL undergraduate research fair in April 2008. This project paper will also satisfy graduation requirements for the UNL honors program and the environmental studies major. This research was supported in part by funding from the J. Ve Srb fellowship.

Leland Russell and Jim Eckberg

The goals of our research at Cedar Point Biological Station / Arapaho Prairie is to identify factors that determine the species composition of Sand Hills grassland plant communities and to quantify how the relative strengths of community-structuring factors vary along topographic gradients in ecosystem productivity. In particular, our experiments address the effects of seed availability and rodent granivory/herbivory upon the number of plant species that co-occur in 0.5 m X 0.5 m plots on dune crests and in swales between dunes. We are manipulating the amount of seed of 10 native species that arrives

in our experimental plots and we have constructed rodent-exclusion cages to manipulate rodent access. Among the 10 native species for which we are manipulating seed input, we have included 5 annuals and 5 perennials to address how life-history is related to seed limitation and rodent effects on plant population size. The seed input manipulation was first imposed in 2004 and has been repeated each year through 2007. We installed rodent exclusion cages in 2006 and 2007. Our goal is examine changes in the plant community as the result of these manipulations over 5-10 years. Our research on plant community dynamics may provide new insight into the biotic forces that influence Sandhills ecosystem resilience and stability.

Larkin Powell and David Logan

Larkin Powell (SNR) and David Logan (Math) continued their Western Painted Turtle (*Chrysemis Picta*) research project at ponds surrounding Cedar Point in 2007.

One PhD student (Amy Parrott) and one undergraduate student (Ken Shum) participated, as well as Larkin's Wildlife Management Techniques courses.

Research in 2007 focused on documenting reproduction in one turtle population; a population with extremely high density. They used x-rays to examine clutch size. Their results show that only the largest females in the pond are reproducing, and their clutch size is approximately half of the normal painted turtle clutch size. Clutch size of females in other ponds (lower density) was normal. They also used temperature loggers to document temperature gradients within a painted turtle nest. Research will continue in 2008, focusing on hormone-related hypotheses to explain low clutch size.



Ken working with the Wildlife Management Techniques students on painted turtles.

The project originated from some interesting results from an exercise in Larkin's 2005 Wildlife Management Techniques course. It developed into the 2006 RUTE scholars project which is when Ken Shum began working on it following his Freshman year. In 2007, Ken was a recipient of funding from the J. Ve Srb fellowship to continue and expand upon his portion of the research project. Ken has been featured in numerous UNL publications as a result of his research on the project.

Vern Bingman and Jeremy Ross, from Bowling Green State University, spent over a week at Cedar Point collecting Lark Sparrows for their project. The aim is to see if and to what extent the brains of migratory Nebraska Lark Sparrows differ from the brains of non-migratory Texas Lark Sparrows.

"We are interested in possible differences in overall brain size as well as differences in the size of specific brain regions", says Bingman. "This work will benefit ongoing discussions of how the evolution of brain organization can be shaped by different ecological pressures. Most work to date has looked at closely related species. One important component of our study is that we are looking at different populations of the same species. Consequently, one can be confident (although not certain) in explaining any brain organizational differences by the one critical difference in their behavioral ecology: migratory behavior. The primary benefit is, potentially, a better understanding of how ecological forces can influence brain evolution/organization."

John Burke and Jutta Burger

University of Georgia

Fitness-Related Qtls And The Mitigation Of Crop-Wild Gene Flow In Sunflower

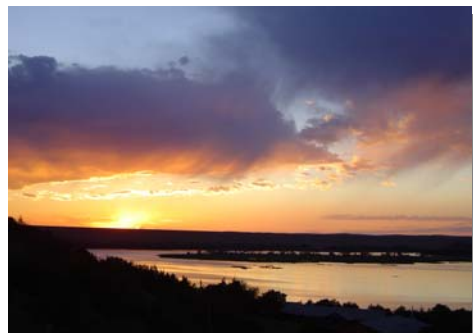


The escape of engineered genes from transgenic crops into their wild relatives via natural hybridization might lead to the evolution of increasingly weedy or invasive pest species. The purpose of this project is to determine whether or not a particular gene containment approach, known as transgenic mitigation, is a workable strategy for limiting the escape and spread of transgenes from genetically modified sunflower into wild sunflower populations. We will genetically map fitness-related quantitative trait loci in experimental crop x wild sunflower hybrids maintained under natural conditions at Cedar Point Biological Station, NE and at Fargo, ND. This work, which will be carried out in multiple locations, and across multiple years, will result in direct estimates of the strength of selection on chromosomal blocks derived from the cultivated sunflower genome, thereby providing us with critical data regarding the likely efficacy of transgenic mitigation as a tool for the containment of engineered genes in one of the world's most important oilseed crops.

Expanded web page look for our new and expanded website at cedarpoint.unl.edu . Our old URL, www.unl.edu/cedarpt , should redirect you to the new site as well. Future editions of the newsletter will only be available on our website or through e-mail, unless you request a paper edition. Update your information with us now.

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We want to hear from you

Fill out the form to let us know what is new. Tell us what is going on with you, where are you employed, any new family additions, or even news of other alumni you may have run into recently. Send Via email (cpbs2@unl.edu) or snail mail to:

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