Biosurvey News

The Newsletter of the Oklahoma Biological Survey
Summer 2007

Biological Survey to Lead Migration Network

All summer long that scissor-tailed flycatcher sits on the phone line or fence in your neighborhood. Have you every wondered where "your flycatcher" and all of Oklahoma's other migrants spend their winter months? A group of scientists has, and now the National Science Foundation has funded this group so that they can try to find out. The Oklahoma Biological Survey is coordinating the Migration Interest Group: Research Applied Toward Education (MIGRATE) network (www.migrate.ou.edu). This network of scientists, headed by Dr. Jeff Kelly, is interested in improving our ability to track migrants through their seasonal journeys that span the Americas. Animals of all kinds undergo seasonal migrations. Whether we are interested in butterflies, sea turtles, lampreys or songbirds, each of these migrants face common problems and share some common solutions in their morphology, behavior and physiology.

The MIGRATE web page at www.migrate.ou.edu.

People's ability to study migration is limited by the tools available for observation. For this reason, what is known about animal movements has come from research involving relatively large, slow-moving or sedentary animals. Recent technological advances are greatly expanding scientists' ability to track small animals over large areas and long time periods. The objective of the MIGRATE network is to accelerate the flow of technology for use in tracking migrants and to train the next generation of scientists in the latest tracking techniques.

Some of the recent advances in tracking technologies include: development of satellite transmitters that allow birds to be tracked continuously across continents; molecular genetic and stable isotope analyses of tissues that allow breeding and over-wintering localities to be identified and populations to be connected; and use of harmonic radar to track flights of individual invertebrates. The MIGRATE network will work to accelerate this progress by making connections among researchers with different areas of expertise and by training students to search across disciplinary boundaries for the key technologies and questions that will move migration science forward.

The MIGRATE network also is interested in helping to conserve our migrants. The scientists of MIGRATE think that migrants will provide some of the most useful indicators of ecological impacts of changing land use and climate. Because migrants need to make rapid ecological responses to changing landscapes, they likely are to be particularly relevant gauges of human impacts on global ecology. In addition, many migrant landbirds require adequate habitat on two continents within the span of days or weeks. For example, Oklahoma's painted buntings arrive in April and leave in August, spend September enjoying the Mexican monsoons and then it's off further south for the winter. MIGRATE views understanding the details of these long-distance movements as a critical step in implementing management and conservation plans such as the tri-national (U.S.A., Canada, Mexico) North American Bird Conservation Initiative and the North American Landbird Conservation Plan. Like people all over the Americas, Oklahomans share responsibility for the welfare of our migrants. The MIGRATE network hopes to help us better understand how our migrants connect us to our southern neighbors.

-Jeff Kelly

Inside this issue:

Survey Director Receives Distinguished Research Award

Dr. Caryn Vaughn, director of the Oklahoma Biological Survey and OU Presidential Professor of Zoology, recently received the Donald W. Tinkle Research Excellence Award from the Southwestern Association of Naturalists. The award is presented to a scientist who, in the past 10 years, has made a significant contribution to the understanding of animals and plants of the southwestern United States, Mexico and Central America through scientific articles and books. Vaughn will receive a plaque at the Southwestern Association of Naturalists banquet next year.

Vaughn's research focuses on ecology and conservation biology of freshwater mussels, and peers recognize her as the expert on freshwater mussels of the Southwest. Her research has been published in more than 40 peer-reviewed publications and has been supported by more than two million dollars in external grants.

The Southwestern Association of Naturalists was founded in May 1953 to promote the study of plants and animals, both living and fossilized, in the southwestern United States, Mexico and Central America.

New on the Web

* Addition of articles, reports, books, and theses by Survey personnel for 2006

* Updated personnel pages

* BioBlitz! page updated for this year's event at the Wichita Mountains Wildlife Refuge

Survey Donates Truck to Washington Volunteer Fire Department

The Biological Survey recently donated an old field vehicle, a 1996 Ford F-350 Crew Cab Truck, to the Washington Volunteer Fire Department. The truck had accumulated too many miles for continued use by survey biologists. It will be used as a first responder vehicle by the firefighters.

Survey Researcher Headed Overseas

Dr. Liz Bergey, an aquatic biologist at the Oklahoma Biological Survey, has been awarded a Fulbright grant to work in Thailand for six months, starting in October of 2007. In Thailand, Bergey will be based at Chiang Mai University, where she will teach medical entomology, do research on the effects of fluctuating water levels below dams on algae and invertebrates, and be a general resource for teaching and research. Being a returned Peace Corps volunteer from Thailand, Bergey is familiar with Thai foods and customs, but has found that her language ability is a bit rusty (luckily, teaching also can be done in English). The Fulbright program is funded through the U.S. Department of State as a mechanism to promote cultural and educational exchange, and is open to both faculty and students. Bergey hopes to develop long-term collaborations with Thai researchers, incorporate tropical aquatic ecology into her teaching at OU, and introduce her family to Thai culture.

Biosurvey News
Summer 2007
Amy K. Buthod and Caryn C. Vaughn, editors

Biosurvey News is published twice each year and reports on the activities, programs and news related to the Oklahoma Biological Survey. We welcome readers' comments and suggestions. The Oklahoma Biological Survey is proud to be a unit in the College of Arts and Sciences at the University of Oklahoma.

This publication, printed by the Oklahoma Biological Survey, is issued by the University of Oklahoma. Eight hundred and fifty copies have been prepared and distributed at a cost of $450 to the taxpayers of the State of Oklahoma.

7TH OKLAHOMA BIOLOGICAL SURVEY BIOBLITZ!
CALL FOR VOLUNTEERS!

Wichita Mountains Wildlife Refuge, Comanche County, Oklahoma

Friday, September 14 and Saturday, September 15, 2007

WHAT: BioBlitz! is a rapid inventory of biological diversity hosted by the Oklahoma Biological Survey and conducted by volunteers from around the state and the region. As many plants and animals in a designated area of public land that can be identified in 24 consecutive hours are tallied. A running tally is displayed during the event and the final results are announced at the conclusion of each BioBlitz!

We invite the general public to attend BioBlitz! on Saturday from 9 a.m. to 3 p.m. Activities and interpretive displays designed to inform people about biological diversity, ecosystem services and the practices of field biology will be featured.

WHEN: The inventory will start promptly at 3 p.m. Friday and conclude promptly at 3 p.m. Saturday.

WHO: Everyone is welcome to BioBlitz! Anyone may volunteer either to take part in the inventory or as support staff.

WHERE: Comanche County, Oklahoma, at the federally owned public lands in the Wichita Mountains Wildlife Refuge.

BioBlitz! Base Camp will be at the Environmental Education Center at the Wichita Mountains Wildlife Refuge, about one mile northwest of the junction of state highways 115 and 49 on highway 49. Registration and all public activities take place in the Wichita Mountains Wildlife Refuge.

VOLUNTEER REGISTRATION: Registration forms will be available online from OBS. Please let us know if you plan on leading a youth group or a class field trip.

WHERE TO STAY: FREE tent camping for all registered volunteers at the Wichita Mountains Wildlife Refuge, Doris Campground Group Camp C, Friday night, September 10 and Saturday night, September 11. Motels are available in the area.

SCHEDULE:

Friday, September 10

Noon – until dark	Register inventory and support volunteers
3 p.m.	BioBlitz! clock starts and inventory begins
7 p.m. – 9 p.m.	Social and barbecue for volunteers, sponsors and invited guests

Saturday, September 11

7: a.m. – noon	Register inventory and support volunteers
9 a.m. – 3 p.m.	Visitors and interpretive activities open to public
3 p.m.	BioBlitz! clock stops and inventory ends
3:15 p.m. – 3:45 p.m.	Final tally, acknowledgements and announcement of the 2008 BioBlitz location
3:45 p.m. – 5 p.m.	Pack up gear, displays, etc. and area clean-up

GET MORE INFO: Contact Ian Butler (ian_b@ou.edu) or call (405) 325-1985. You may also sign up to receive e-mail on our Web site: http://www.biosurvey.ou.edu

Geographic Variation in Neotropical Birds

By accident of history, most of the world's economically developed nations lie in temperate zones. I have no desire to delve into the many thorny issues related to this disparity, but a particular feature is germane to my interest in Neotropical birds. With their disproportionate wealth and the higher level of research and educational funding that goes with it, much more is known about bird species in temperate countries than in tropical countries. On the surface this problem looks minor, but another accident of history makes the problem major: some 80 percent of bird species are tropical, and many bird families are unique to the tropics. We thus know much more about a decided minority than we do about an overwhelming majority.

A woodcreeper. Photo by Curtis Marantz.

An especially deep temperate-tropical divide in avian diversity occurs among the passerines - the perching birds. Passerines fall into two main groups: the oscines - the so-called "songbirds" - and the suboscines. A posited fundamental difference between these suborders is the means by which they acquire their songs: in songbirds most song is learned, but in suboscines song is innate. As a result, geographic variation in songs could provide insight into species limits, and local adapation may manifest itself in variation in plumage, morphology and voice. To this end, variation in these features offers a rich study system for drawing inferences about processes associated with species formation.

The songbirds dominate temperate areas. In North America, for example, of the suboscines only various species of tyrant flycatchers reach the United States, yet even then the bulk occurs in the tropics. All other perching birds in the United States are songbirds. Suboscine families such as antbirds, manakins, cotingas and ovenbirds (not to be confused with the Ovenbird, a warbler that breeds north to Canada) reach southern Mexico, tapaculos reach only Costa Rica, and yet others such as gnateaters and crescentchests do not occur outside of South America. Another strictly tropical suboscine group, ranging from central Mexico to the northern fringe of South America's southern cone, is the woodcreepers. Picture a Brown Creeper the size of a large woodpecker and you get the general idea of this family.

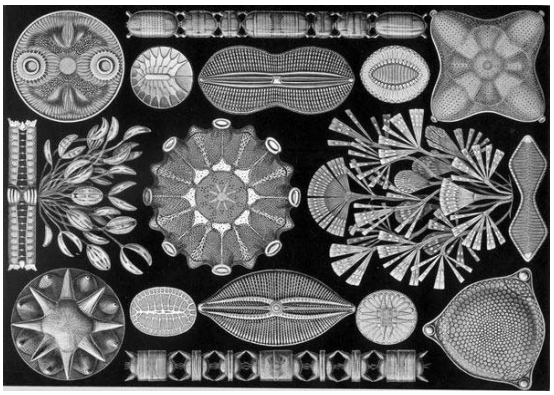
With colleagues at the Universidad Central de Venezuela, NSF postdoc Curtis A. Marantz and his supervisor Jorge L. Pérez-Emán, I have been involved in studies of geographic variation in two woodcreeper groups. One is a rangewide study of vocal variation in the Buff-throated and Cocoa Woodcreepers, two species only treated recently as distinct. Results thus far have both provided support for molecular and morphological systematics and challenged existing divisions. For example, genetics place the species break in northeastern Venezuela, with the Cocoa Woodcreeper north of the llanos and west of the Orinoco delta and the Buff-throated Woodcreeper south and east of those regions. Yet songs of the Buff-throated on the Guianan Shield are closer to those of the Cocoa than they are to those of other Buff-throated populations to the south, particularly those south of the Amazon.

A parallel study is a multivariate analysis of morphological variation in the genus *Dendrocolaptes*, which contains five species nearly spanning the range of the family. Bill shape diagnoses this genus from all others, and it differs between sexes, implying niche differentiation. Like the Buff-throated and Cocoa Woodcreepers, two species in this genus have been accorded species status only recently. These species, now dubbed the Northern Barred-Woodcreeper and Amazonian Barred-Woodcreeper, differ strikingly in song; indeed, the Northern is an outlier vocally among all woodcreepers, not just members of this genus. Morphological variations further support this recent split: structurally, the Amazonian is the most distinct member of the genus.

Continued on page 5

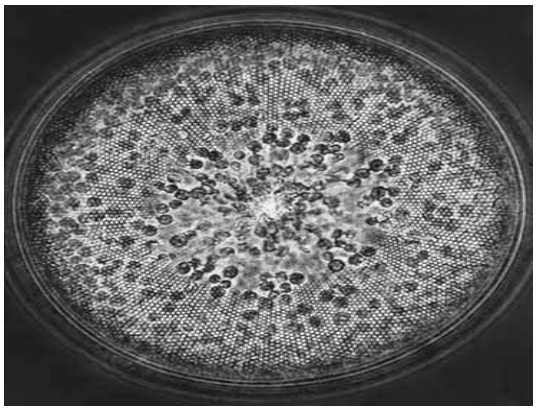
Graduate Student Research: Diatoms and Rock Pools

Diatoms are a group of single-celled microscopic algae that create highly ornamented glass cell walls and form the base of freshwater and marine food webs. Diatoms live in aquatic habitats ranging from moist soils and wetlands, to lakes, streams and oceans. They can be found virtually everywhere around the world, including in what we would consider "extreme habitats" for life such hot springs or below the Antarctic ice. They are one of the most diverse groups of organisms, with between 10,000 and 10 million species. This makes them an ideal group for biodiversity research. A single cup of water from a pond or a scraping from a stream stone could yield approximately 20 to 70 species and thousands of individuals.



Misellaneous diatoms from Ernst Haeckel's Kunstformen der Natur.

The diversity of diatoms is similar to that of plants, which includes rare and common species, and communities can be as diverse as those found in grasslands or rainforests. Historically, diatom species were considered widespread, with the same species occurring worldwide in similar habitats. However, this view is changing as research shifts from streams and lakes to more unique habitats, such as wet rock walls, high-altitude ponds and rock pools. These under-sampled habitats are providing new species, which have restricted ranges.



The diatom Coscinodiscus. Photo by Wim van Egmond.

Why are rock pools so interesting? Just as isolated islands in the Pacific Ocean such as the Galapagos each have their own species of birds and tortoises, rock pools isolated from others by expanses of inhospitable dry land may have completely different diatom communities. These rock pool habitats have experienced very little degradation from human activities, which makes them ideal for studying natural biodiversity patterns.

As part of my master's thesis research under the supervision of Dr. Liz Bergey, I am using a combination of field and laboratory approaches to study the ecology of rock pool diatoms. I am surveying the diatoms in rocks pools that form on the granite outcrops in several state wildlife areas: Quartz Mountain, Wichita Wildlife Refuge, Ten-acre Rock and Six-acre Rock. I am comparing these communities and examining how environmental factors and dispersal shape their distribution. This study will provide important new information on the ecology of diatoms in extreme environments.

Joshua Cooper is a master's student under the direction of Dr. Liz Bergey.

Geographic Variation in Neotropical Birds, continued from page 4

We presented preliminary results for the studies at the Neotropical Ornithological Congress—held every four years—in Maturín, Venezuela, May 13-20, 2007, but further work remains. In addition to delivering a talk at the congress, I spent more than two weeks in the field with Marantz recording additional songs and conducting playback experiments. In between, I worked further on the morphological analyses. Each new datum provides another piece of the puzzle we are reconstructing of these species' evolution.

-Michael A. Patten

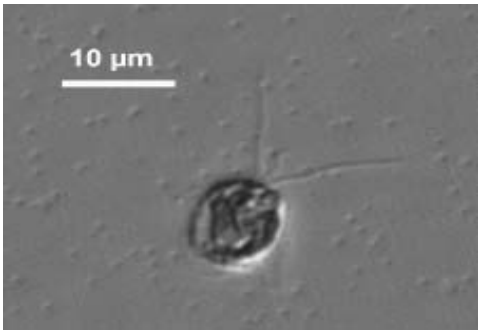
Biosurvey News
Oklahoma Biological Survey
University of Oklahoma
111 East Chesapeake Street
Norman, OK 73019-5112
(405)325-4034
www.biosurvey.ou.edu

Biodiversity: Toxic Golden Algae (*Prymnesium parvum*) Invade Oklahoma Waters

Many Oklahomans are familiar with algal blooms in streams, farm ponds and even our largest reservoirs. Algal blooms typically result from the addition of excess nitrogen and phosphorus from runoff and sewage. Algal blooms often impart a green color or odd tastes and odors to the water. Severe blooms can lead to loss of oxygen in the water at night and subsequent fish kills. Some species of algae produce chemicals toxic to other algae, as well as other aquatic organisms. Blooms of such algae are called Harmful Algal Blooms (HABs). In inland waters, most HAB species belong to the Cyanobacteria or, because of the color of their photosynthetic pigments, "blue-green algae." Recently, another group of HAB algae has become important in Oklahoma – "golden algae."

Golden algae are microscopic organisms existing as single cells, but are more complex than bacteria. They are small (8-10 µm) and have two chloroplasts containing green chlorophyll like most algae and plants. They also contain other pigments that give them their characteristic golden color. Golden algae have two long flagellae for movement and a short haptonema, a flagella-like structure that is believed to function in the consumption of bacteria and algae. Thus golden algae are both plant-like and animal-like!

The golden alga, *Prymnesium parvum*, originally a marine species, first was reported in North America from the Pecos River system (Texas) in the mid 1980s. During the past two decades *P. parvum* gradually spread northward, blooming and causing fish kills as far as Lake Meredith on the Canadian River. They first appeared in the Red River basin (Lakes Kemp and Diversion, Texas) in 2001, blooming in Lake Texoma during the winter of 2004 and causing substantial fish kills. Blooms and fish kills also occurred in Altus City Reservoir in 2004 and 2005. No bloom occurred in Lake Texoma in 2005, but blooms and fish kills occurred again in 2006 and 2007.



Prymnesium parvum or golden alga.

The transfer of golden algae from marine to freshwater systems is thought to have been aided by migrating birds, boating and possibly aerial propagation of cysts (dormant life stages capable of resisting harsh environmental conditions). As with other exotic species that find a niche in a new environment, once golden algae arrive, they soon become established members of the community.

--Dave Hambright