



## Environmental Project involves STEM Residential College

Students in the STEM residential college are teaming up with biology faculty and graduate students to begin research programs in UCA's Jewel Moore Nature Reserve and along Stone Dam Creek. Students are starting a volunteer initiative that will establish a long-term ecological dataset that will help provide solutions for maintaining and improving the ecological quality of UCA's most valuable natural resources. STEM students, organized by Leah Horton, met with Katherine Larson, Sally Entekin, Nicki Jensen, and Coleman Little in February to assemble teams that will document seasonal changes in climate and plant (*continued*)

## Physics Students Tour NLR Hydroelectric Power Plant



The Society of Physics Students toured the Murray Hydroelectric Power Plant on a rainy March 8th. The plant is located in North Little Rock near the Big Dam Bridge and is a part of the Murray Lock & Dam. Physics faculty members Nancy Austin, Jack Gaiser and Will Slaton accompanied the students and toured the facility, which was built in 1989. The plant houses two water turbine powered generators that provide electrical power for North Little Rock and Sherwood. These generators are monster machines (110 tons each) that dwarf the visitors - even the tools used to work on the turbine are huge! Power is delivered by a difference in water level on either side of the lock. This difference in level forces water through a tunnel that narrows to 27.6 feet in diameter at the location of the turbine blades. The (*continued*)

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## Save the Date!

**Planetarium Show**  
Tuesday, April 5  
7:00 – 8:00 p.m.

**Advanced Registration Begins for Summer & Fall 2011**  
April 4 - 25

**Bear Facts Day**  
Friday, April 8

**AR Academy of Science**  
April 8 - 9  
Hosted by U of A at Monticello

**Chalktalks**  
Thursday, April 14  
X-Period, LSC 101

**Observatory Public Show**  
Tuesday, April 19  
9:00 – 11:00 p.m.

**Student Research Poster Symposium**  
Friday, April 22  
2:00 – 4:00 p.m.

**Study Day**  
Friday, April 29

(*Hydroelectric Plant continued*) turbine is constructed of three stainless steel blades that appeared to be a foot thick where they joined the turbine shaft. The blades turn slowly at 46 RPM so that fish and large rocks can flow through without damaging the turbine (in the case of the rocks) or damaging the fish. Steel wicket gates are used to regulate the flow of water. The turbine shaft connects to an electrical generator via a gearbox that increases the rotational speed to 450 RPM. Each electrical generator is rated at 22.8 Megawatts. This electricity is then transformed into a useful form for distribution on high voltage lines.

It was interesting to note that the power plant

technicians are in constant communication with other Lock & Dam facilities along the Arkansas River. In particular, the Toad Suck Lock & Dam here in Conway must inform the Murray Lock & Dam about changes in flow rate and water level. It takes approximately two hours for a change in flow rate at the Toad Suck facility to be noticed in North Little Rock.

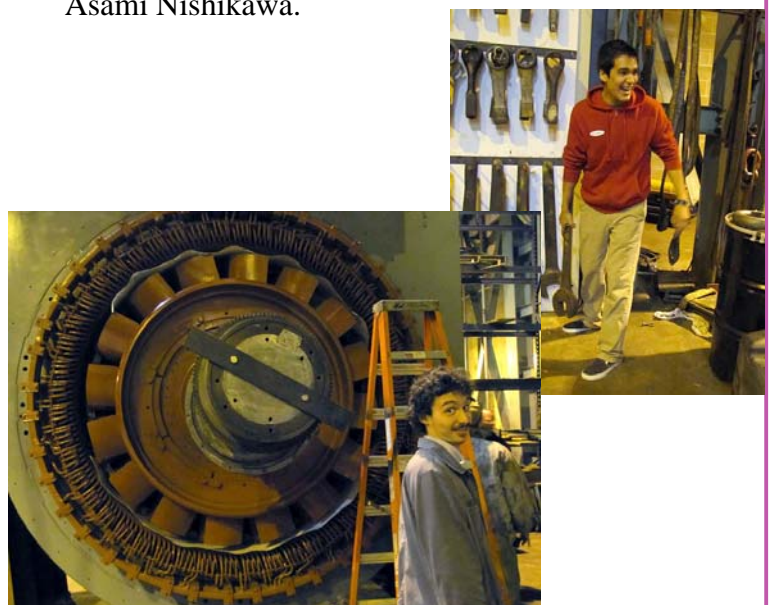


The group was able to tour inside one of the turbine tunnels because the unit was closed for renovations. The turbine's electricity generator was removed



several weeks ago and sent for cleaning. Soot and grease have degraded the electrical performance of the generator over its 20+ years of operation. Additionally, the inside of the turbine tunnel connecting the high and low water levels was being inspected and cleaned during this time. The renovated generator was back on-site at the time of the tour and would be lowered back into position soon. The students and faculty had to ride in a small single person elevator that creaked all the way down the 100 feet to reach the level where the turbines are located.

The SPS and the Department of Physics and Astronomy would like to thank Bob Reynolds with the North Little Rock Electric Department for leading our tour and answering numerous questions from students and faculty. We had a great time! Photo credits go to Ashley Cooper, Trey French and Asami Nishikawa.





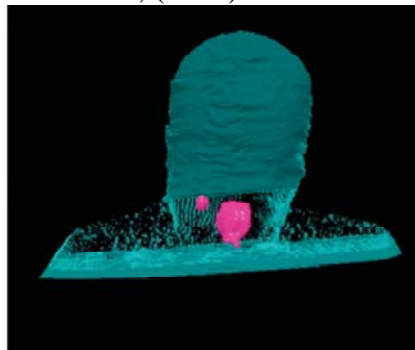
*Students in restoration ecology taking baseline data to establish restoration needs in Stone Dam Creek. Photo taken in front of the Reynolds's Performing Arts Center.*

*(Environmental Project continued)* phenology, identify and record invertebrate and fish diversity in the creek and vernal pools, and identify and record butterfly and bird diversity in the Jewel Moore Prairie. Teams will be working closely with biology and computer science graduate students to develop the infrastructure for long-term documentation of changes and improvements occurring in these two ecosystems as restoration projects are implemented. If you are interested in participating or would like more information please contact Drs. Katherine Larson or Sally Entrekin in the biology department.

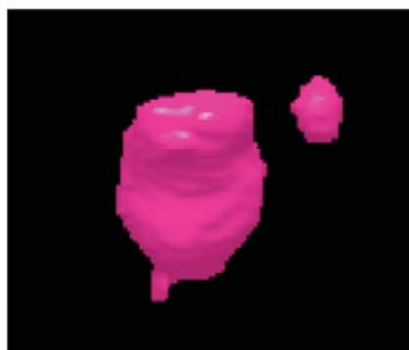
## Head and Neck Cancer Research in Computer Science

Dr. Sinan Kockara from the Department of Computer Science received ASTA and NSF funding with the amounts of \$15,000 and \$18,000 respectively for investigating prognostic factors of Standard Uptake Value (SUV) distributions in head and neck cancer patients. Dr. Kockara's collaborators on this project are Mauricio Moreno, M.D. and Gal Shafirstein D.Sc. from UAMS.

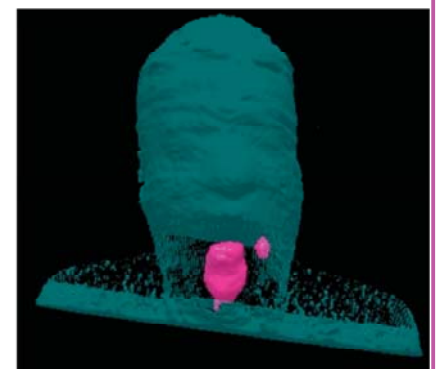
After the introduction of quantitative analysis of Positron Emission Tomography (PET) scan for monitoring the early response of tumors in breast cancers in 1993, (SUV) has been used as a prognostic factor in cancer cases in addition to anatomical metrics of the tumor such as the volume or the growth rate. However, current studies have focused on using a single value like maximum SUV or mean SUV rather than a whole distribution. Moreover, two important prognostic factors, volume and SUV distribution have not been studied together. In this on-going study, SUV distribution and the tumor volume will be used to develop a prognostic model for head and neck cancers. The images to the right show a sample segment and the three-dimensional image built by putting segments together. The pink object in the images is the tumor.



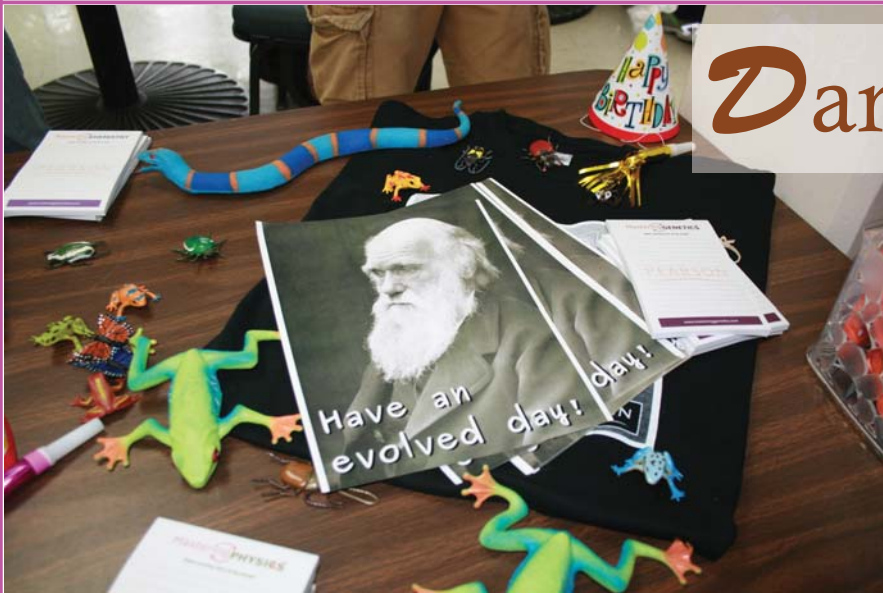
*a) sample segment*



*b) 3D image of tumor*



*c) 3D image of head and tumor*



# Darwin Day 2011

The UCA Biology Department and Pearson Higher Education hosted "Darwin Day" on March 3.

Darwin Day is a global celebration of science and reason held near the birthday of Charles Darwin, who was born Feb. 12. However, inclement weather forced this year's celebration to be postponed.

"The goals for this event are to inform the public about the importance of evolution

as the unifying theme of modern biology as well as the life and work of Charles Darwin," said Dr. Mark Bland, professor of biology and director of the Arkansas State Science Fair.

There were two speakers for this year's event. A UCA scholar, Dr. Ben Waggoner, whose talk focused on Darwin's obsessive quest to understand a little-known animal, the barnacle. Dr. Jason Wiles, from Syracuse University, an Arkansas native, gave a lecture entitled "Seeing the Light of Evolution: An Arkansan's Journey Toward Understanding and Acceptance of Biological Change."

Free birthday cake was served. Along with the lectures, the PBS's seven-part series "Evolution" was shown.

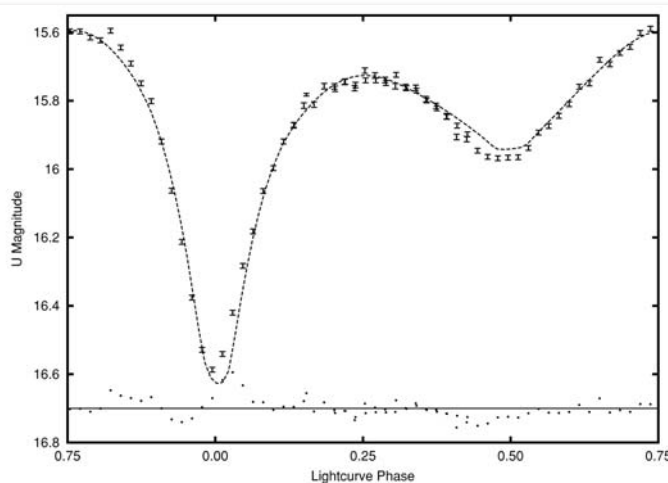


## Binary Star Publication

**S. J. Austin, J. W. Robertson, T. R. DeSouza, C. Tycner, and R. K. Honeycutt, "The Chromospheric Activity of [HH97] FS Aur-79: A Close Binary With Late-Type Active (dK7e+dM3e) Components", The Astronomical Journal, 141:124 (14pp), 2011 April, USA.**

FS Aur-97 is a rare type of binary star system. The stars are orbiting each other so closely they are almost touching, and it only takes approximately six hours for the stars to go around each other. The measured orbital speeds the stars are 121 km/sec and 224 km/sec. We have determined that the stars are smaller than the Sun (0.7 and 0.3 times the mass of the Sun) and cooler than the Sun (0.7 and 0.6 times the surface temperature of the Sun). The Sun has sun spots due to solar magnetic activity; our analysis shows that these stars are more magnetically active and have large star spots. We were able to map this activity from spectroscopic observations of the chromosphere (the thin stellar atmosphere above the stars) using a technique called tomography (also

used in certain types of medical imaging). The amount of lithium observed in the atmosphere of star can be used as a chronometer. Since we observed an absence of lithium, this binary system must be 500 million years old or older. Therefore, we conclude that this system originally formed at a much greater separation and has had time to evolve, most likely through angular momentum loss by stellar winds coupled to the magnetic fields, to the current close binary configuration. Our spectroscopic data came from observing time we were granted on the 9.2 m Hobby-Eberly Telescope on a competitive basis through a National Optical Astronomy Observatory observing proposal.



**Figure 1.** Phased *U*-band photometry from Austin et al. (2007) shown with error bars. Dashed curve is the resulting *U*-band light curve from the best-fit Wilson-Devinney model. Dots are the observed minus computed residuals where the solid horizontal line at a magnitude of 16.7 represents the zero residual level.

### Dr. Clancy advises the FDA

Dr. Barbara Clancy, Biology, was invited to participate as a special government employee at a meeting of the FDA's Anesthetic and Life Support Drugs Advisory Committee held in Silver Spring Maryland the week of March 10, 2011. The FDA was seeking advice on how to conduct studies to determine whether anesthesia can cause neurological damage in infants and young children. Barbara Clancy was invited as a voting member, and to present her research on how to translate developmental timelines from experimental animal species to humans.

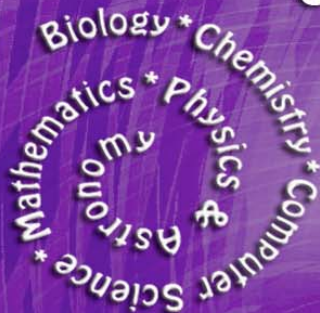
### Dr. Robert Mauldin Publication

Dr. Robert Mauldin, Professor and Chair of Chemistry, published an article entitled "Definition and Formulation of Scientific Prediction and Its Role in Inquiry-Based Laboratories" in the April 1, 2011 edition of the Journal of Chemical Education.

Abstracts Due April 1<sup>st</sup> in electronic format only

*The College of  
Natural Sciences and Mathematics*

**University of Central Arkansas**



*Announces*

**The 17th Annual Student  
Research Poster Symposium**

**April 22, 2011**

**2:00 - 4:00 pm**

**McCastlain Hall  
Ballroom**

REFRESHMENTS WILL BE SERVED

**COME MEET SOME OF OUR NATION'S FUTURE SCIENTISTS  
AND LEARN ABOUT THEIR RESEARCH PROJECTS!**

Spaces are still available...Register TODAY!!!



*presents*

## ***Leopold Education Project Workshop*** ***Exploring the Outdoors with Aldo Leopold***

**Date:** April 8, 2011

**Time:** 9:00 - 4:00

**Place:** Faulkner County Natural Resources Center  
110 South Amity Road, Conway, Arkansas

**Facilitators:** Marc and Suzanne Hirrel

**Cost:** \$35 for AEEA members  
\$45 for non-members

Fee includes materials, lunch, resources and 6 hours of ADE-approved professional development

**What kind of workshop?** In this environmental education workshop, hands-on participation in a number of Leopold Education Project (LEP) activities will provide basic but highly useful information on natural history and conservation ethics, preparing educators to successfully and efficiently use the curriculum materials with students. Each participant receives lunch, a personal copy of Leopold's *A Sand County Almanac*, and a digital copy of the new curriculum entitled *Exploring the Outdoors with Aldo Leopold* designed for informal audiences. Interested participants will have the opportunity to purchase the classic curriculum entitled Lessons in a Land Ethic for an additional \$20.

**What topics will be covered?** This fast-paced workshop will leave you inspired as you read and contemplate the words of Leopold, fascinated as you study tracking and "reading the landscape", and confident in activities designed to help you lead your classroom outdoors. These activities will cover plant, bird, and track identification, habitat studies, ecological relationships and more. The workshop will also show you a fun and easy way to teach the natural sciences and to encourage kids to get outdoors. Understanding becomes real when students can see, touch and experience the natural world around them.

**What is LEP?** Leopold Education Project, Pheasants Forever Land Ethic Curriculum, is an innovative environmental education curriculum based on essays from *A Sand County Almanac*, written by renowned conservationist, Aldo Leopold. This workshop expands upon previous lessons included in the basic LEP course by featuring a just recently published non-formal curriculum. Participants will receive a copy of *A Sand County Almanac* and a digital copy of the new curriculum.

**Who should attend?** This workshop welcomes returning LEP participants as well as those new to LEP. The workshop is designed for 4th-12th grade educators (science, language arts, math, art, history), non-formal educators, natural resource professionals, 4-H and Scout leaders, conservation leaders, nature center and zoo educators and anyone interested in learning more about fostering a relationship between our youth and the natural world. Each participant will receive a wealth of materials easy to use with both adults and youth.

*Lunch will be provided by ZaZa Fine Salad & Wood-Oven Pizza Company. ZaZa is committed to being a low impact, environmentally friendly business.*

**To register:** Mail your contact information including: your name, organization, email and phone number along with a check or Purchase Order to:

AEEA  
Attn: LEP workshop  
PO Box 1439  
North Little Rock, AR 72115

For more information, contact Brad Robertson at [info@arkansasee.org](mailto:info@arkansasee.org) or (501) 773-1107