Undergraduates Gain Experience through Summer Research Programs

Undergraduate students from across the nation were on the University of Arkansas campus participating in a variety of Research Experiences for Undergraduates programs. The programs are designed to give students hands-on experiences in research areas of their choice while introducing them to careers in scientific research.

The programs offered are focused in seven disciplines: chemistry, computer science and computer engineering, ecosystem services and agricultural sustainability, electrical engineering, mechanical engineering, microelectronics-photonics and physics. Students in the programs worked with faculty members on research projects during their 10-week stay at the U of A.

In addition to conducting research, students took field trips to industrial sites and participated in various social and team-building activities. "Dinner and Dialogue" events aimed at preparing the students for graduate school. Discussions centered on topics such as research ethics and business etiquette. Students also interacted with a panel of current University of Arkansas graduate students who talked about their experiences in graduate school.

More than 80 undergraduates from 26 states were on the U of A campus as part of the research programs. The 10-week programs, which are funded by the National Science Foundation, began May 17 and concluded July 24.

David Paul and Julie Stenken co-direct the Chemistry and Biochemistry REU program. Also incorporated into the REU program is the NIH INBRE program, which serves undergraduates with an Arkansas connection. Students are engaged in research on 3 campuses - UAF, UAMS, and UALR. The two combined programs hosted 15 students on the UAF campus. Twelve were REU, and 3 were INBRE. A list of students and their mentors appears on page 6 of this issue.
March 11, 2015

Faculty News

On the Go

Roger Koeppen gave an invited talk, “Molecular Framework for Addressing Ionization Properties of Lipid-Exposed Protein Functional Groups,” at the Protein Electrostatics Workshop of the Telluride Science Research Center, July 6-10 in Telluride, Colorado.

Denise Greathouse gave an invited talk, “Membrane interactions of antimicrobial lactoferricin peptides by solid-state NMR and fluorescence spectroscopy and MD simulations,” at the Workshop on Biological Membranes and Membrane Proteins: Challenges for Theory and Experiment, hosted by the Telluride Science Research Center, July 13-17 in Telluride, Colorado.

Roger Koeppen gave an invited talk, “Molecular Determinants of Transmembrane Orientation for Neutral and Ionizable Peptides,” at the Workshop on Biological Membranes and Membrane Proteins: Challenges for Theory and Experiment, hosted by the Telluride Science Research Center, July 13-17 in Telluride, Colorado.

Wei Shi gave an invited talk, “Chemical Proteomics to the Development of Natural Glycoconjugates as Novel Anticancer Agents,” Department of Applied Chemistry, College of Science, China Agricultural University, May 25, 2015.


Wei Shi presented an invited lecture, “Chemical Proteomics to the Development of Natural Glycoconjugates towards Novel Anticancer Agents” Department of Applied Chemistry, College of Sciences, China Agricultural University, Beijing, China, May 25, 2015.

Publications

“Open Chain Analogs of Natural Ipomoeassin Resin Glycosides” provisional application, filed on June 10, 2015.

Biophysical Journal

This fall, Mahmoud Moradi will join the Department of Chemistry and Biochemistry as an assistant professor in the J. William Fulbright College of Arts and Sciences. He comes to the University of Arkansas from the University of Illinois at Urbana-Champaign where he was a postdoctoral research associate.

Moradi’s research area is computational molecular biophysics. His research will be on developing ways to better simulate the large-scale motions of proteins at an atomic level. "Proteins are the basic machinery of cells and machines have to move to work, but our ability to model and predict those microscopic motions is fairly limited," Moradi said. "Drugs, for example, often lock proteins into an active or inactive configuration, but better understanding of how proteins switch back and forth between such configurations could lead to designing better drugs."

Moradi is an editorial member of Nature Publishing Group’s Scientific Reports. He has co-authored more than 20 articles with more in preparation.

"Dr. Moradi has a variety of fascinating research interests, from petascale supercomputing algorithms to nonequilibrium statistical mechanics," said Wesley Stites, department chair. "The proteins he will be simulating are involved in biomedically relevant processes such as membrane transport, multidrug resistance, and neurodegenerative diseases."

Moradi earned a Bachelor of Science and Master of Science in physics from Sharif University of Technology. He holds a doctorate in physics from North Carolina State University.

Newswire, July 29, 2015. Meaghan Blanchard, Communications Intern, Fulbright College

The Mole Street Journal


Joshua Sakon will be leading a workshop, The 1st International Workshop onNano-Bio Photonics, at the POSCO International Center, POSTECH, Korea, August 4-5, 2015.

Patents


Shi, W.; Zong, G.-H.; "Open-Chain Analogs of Natural Ipomoeassin Resin Glycosides" provisional application, filed on June 10, 2015.
From the Chair - Wesley Stites

This late summer and the start of the new academic year are seeing change in the department on a scale we have not had in many years. On previous and subsequent pages we tell you more about our two new assistant professors starting in August. We are, of course, very excited to have them coming on board. We are less excited that long time staff members Jerry Homesley, David Hayes, and Vickey Hayes have already or shortly will leave us. Professor Dan Davis just retired and Bill Durham and Peter Pulay have announced their pending retirement. Our facilities are changing too. Early this week we meet architects and contractors about the final phases of renovation of the Discovery (as we now call the old Science building) teaching labs. As I write this, I have just come from a meeting with architects and engineers about pending renovation in some rooms of the Chemistry and Biochemistry research building. Our ‘new’ building is now old enough to need major work to meet changing needs.

Change is inevitable, but it can be difficult to get right. And difficult usually means expensive. While much of the work will be paid for by the central administration, unfortunately, that money is often, shall we say…rigid. I am very grateful to all of you who have helped us out in this last year with donations. The cushion the unrestricted funds you have provided us with will really help make the renovations better serve the needs of new faculty and students. Adding just a few dollars to the budget can make a huge difference in the usefulness of result from the construction work, not to mention, on occasion, the aesthetics. It is amazing what a hundred dollars of paint can accomplish. Change is here, like it or not, but the contributions of alumni and friends of this department are making it easier and more positive. Thank you!

### Sin Limites (No Limits) Latino Biliteracy Project

Denise Greathouse partnered with Luis Restrepo and Jeanette Arnhart, from the World Languages, Literature and Cultures Department at the University of Arkansas, to teach a chemistry lab, *Art in Science and Science in Art: Tempera versus Oil Paint*, to a group of 34 local middle-school students participating in the *Sin Limites* (“No Limits”): Latino Youth Biliteracy Project. This is the third year of the Sin Limites enrichment program aimed at improving the language skills of students who are growing up in Spanish-speaking homes where they learn to speak and understand Spanish but may not be fluent in reading and writing in Spanish. The *Sin Limites* program began two years ago as an after-school program at J.O. Kelly Middle School in Springdale, and was as extended into a two-week summer program last year. The program’s goals are to help students develop skills required for academic success and to prepare them to live in a global society. According to Restrepo, “Research has shown that being biliterate in English and Spanish helps students academically, because the analytical and reading skills that are developed transfer across languages.” Graduate students Ashley Henderson, Venkatesan Rajagopalan, Matt McKay, and Fahmida Afrose, undergraduate students Jordana Thibado, Vasupradha Suresh Kumar, and Armin Mortazavi assisted with the science lab on Friday, June 26. The middle-school students prepared tempera paint from egg yolk and compared its properties with oil paint. While engaged in the activity, students were introduced to the concepts of hydrophobicity, hydrophilicity, and amphipathicity. Many thanks also to David and Victoria Hayes and the Chemistry department for the use of the Chemistry Teaching labs. The program is sponsored by a 21st Century Community Learning Center federal grant and by La Oficina Latina and Centennial Bank.
Jerry Homesley Retires

Jerry Homesley joined the chemistry-biochemistry “family” in September 1999 where he began by restoring many devices and systems into working order that were labeled “broken.” With 40 years of electronics industry experience, Jerry supported many different areas within the Chemistry department. His most important responsibility was to always ensure that students and professors could prove their research on equipment that was working accurately and consistently. Jerry says that this position required a pretty large tool kit for electronics, electrical, electromechanical, mechanical, plumbing, and other skills.

A highlight of Jerry’s career with the U of A was the installation of a handmade Tower Clock in Old Main. The clock was dedicated during the Campaign for the 21st Century. Jerry and Wally Cordes worked with David Gearhart to obtain approval and funding to build the clock. Jerry located one of the very few family-owned U.S. businesses to design and hand-make the mechanical movement. Jerry has been the clock caretaker since its first “tick” ten years ago.

Jerry worked in the oil, natural gas and geophysical industries before joining the U of A. He was part of a team that developed the first geothermal petroleum logging tool certified to 700 degrees F. He built the complex working electronics on a new state-of-the-art, natural gas pipeline leak detector known as a “pig”. Perhaps it was an early indication that he would later work with Hogs!

Jerry is a native Arkansan living in the Boston Mountains outside Elkins. His wife, Terry Homesley, is a communications/project management professional. She recently retired after 13 years with Walmart corporate. Jerry and Terry plan to pursue their hobbies and enjoy family and volunteer activities.

Jerry and the Hayeses, David and Vicky, were honored with a departmental ice cream social to celebrate their retirements. The Hayes’ retirement was announced in the June 2015 issue of The Mole.

Highly Cited Publications

The articles listed below are the most highly cited papers published from the Department of Chemistry and Biochemistry at the University of Arkansas. The numbers of citations reflect listings from the Web of Science as of June 30, 2015.


*Paper one is the most highly cited article ever submitted from the State of Arkansas. During the 365 days of year 2014, this paper was cited 307 times.
Sakon Awarded Patent

Drug developed to fight baldness

The U.S. Patent and Trademark Office has issued a patent to the University of Arkansas for a drug developed through research at the university for treatment of hair loss and other disorders.

Joshua Sakon, associate professor of chemistry and biochemistry at the U of A, is one of four co-inventors of the pharmaceutical protein now known as BMD-2341. The patent, titled “Fusion Proteins of Collagen Binding-Domain and Parathyroid Hormone,” was issued June 23 to the University of Arkansas System Board of Trustees, the Ochsner Clinic Foundation and the National University Corporation Kagawa University in Japan.

BiologicsMD, a drug discovery firm headquartered at the Arkansas Research and Technology Park, holds the exclusive license to the patented technology and is developing a line of protein therapeutics and drug/device combination products to treat hair loss and baldness.

This is the second U.S. patent awarded to Sakon and his co-inventors for the family of discoveries. In 2013, the U.S. Patent and Trademark Office awarded a composition of matter patent for the protein therapeutics for the treatment of osteoporosis and other bone maladies. BiologicsMD also holds the exclusive license for these patents.

“"A derivative of the original drug has an effect in reversing or suppressing hair loss,” Sakon said. “Specifically, it could be applied to treat alopecia, a condition in which hair loss occurs in patches on the scalp, or in cases of chemically induced alopecia, which occurs during chemotherapy. The drug has been successful in treating hair loss in mice and I look forward to seeing the drug move into clinical trials.”

Electrochemical Materials Specialist Joins Chemistry Department

Robert Coridan is one of two new faculty members in the Department of Chemistry and Biochemistry in the J. William Fulbright College of Arts and Sciences. Coridan will join the department this fall as an assistant professor. He comes to the University of Arkansas from the California Institute of Technology, where he was a postdoctoral scholar in the Department of Chemistry.

“We are happy to welcome to Dr. Coridan to our faculty,” said Wesley Stites, department chair. “His patent work and extensive publications are very impressive.”

Coridan’s current research interests involve the chemical conversion of sunlight into fuels and electricity. “Generally, people think of turning sunlight into electricity with giant, rooftop solar panels. But you can also develop materials that convert sunlight into chemicals like hydrogen or hydrocarbons,” he said. “This is called ‘artificial photosynthesis’ because we are trying to replicate the process of converting light into chemistry in plants. We are working to develop materials that will perform these reactions more efficiently and more robustly than plants’ leaves. We hope mimic nature even further by designing simple components that will assemble themselves into complicated structures to address these issues.” He has developed a number of approaches to making structured semiconductors for improving light absorption and catalysis. This work has resulted in high impact publications and two patents.

“I’m excited to begin my work at the University of Arkansas,” said Coridan. “My group will take advantage of the significant resources and shared facilities on campus. There also seems to be many opportunities for collaboration, which I look forward to as well.”

Coridan was also involved in public outreach while he was a postdoc. He served as a physics lecturer for the Caltech Juice from Juice Program, where graduate students, postdocs, and professors taught high school students and teachers about solar energy. He also mentored undergraduate students in the Caltech Summer Undergraduate Research Fellowship program.

Coridan holds a Bachelor of Science in physics and in computer science from The Ohio State University and a doctorate in physics from the University of Illinois, Urbana-Champaign.
The Mole Street Journal

REU and INBRE Students (continued from page 1)

Casey Einfalt, John Brown University, Ingrid Fritsch, mentor. Enzyme Modified Microelectrodes toward a Miniaturized Biofuel Cell Cathode

Colby Evans, University of Central Oklahoma, Stephan Kilyanek, mentor. Investigation of a Copper 1,10-Phenanthroline Oxalate Complex for Oxygen Reduction in Alkaline Conditions

Joshua Ficut, Henderson State University, T.K.S. Kumar, mentor. Isolation of Heparin from Chicken Intestine

Kenton Hicks, Wabash College, Paul Adams, mentor. Binding Interactions between Inactive Cell Division Cycle 42 (CDC 42) and Small Molecule ZCL278

Ashley Litton, Central Methodist University, Wei Shi, mentor. Evaluating Ligands to Aid in Chemical Methods of Selective Protein Detection

Madeline Meier, University of Arkansas, David Paul, mentor. Determining Diffusion Coefficients using Electrochemical Time of Diffusion (ETOD)

Patrick Pysz, University of Arkansas, Julie Stenken, mentor. Methods for Improving Cytokine in vivo Calibration during Microdialysis Sampling

Daylan Sheppard, University of Utah, Nan Zheng, mentor. Exploitation of the Reactivity of Photogenerated Benzylic Cations using Carbon Nucleophiles: Intramolecular Oxidative C-C Bond Formation Generating N-Arylindolines

Samuel Vincent, University of Arkansas at Monticello, Ryan Tian, mentor. Characterization of Unknown Samples using ICP-MS: Prospecting for Precious Metals

Maegan Weaver, University of Arkansas, David Paul, mentor. Designing a Glucose Oxidase Biosensor in Anaerobic Conditions by Producing Conductive Polymers for Direct Electron Transfer

Autumn Webb, University of Arkansas at Monticello, Feng Wang, mentor. Molecular Dynamic Investigation of Ice Nucleation and Growth in Supercooled Water in the Presence of an Electric Field

Ryan Kinney, John Brown University, Doug Rhoads, mentor. Association Study of Ascites in Chromosome 2 of Gallus gallus at 71.32 Mbp

Megan Parks, Lyon College, Christa Hestekin, mentor. Micellar Electrokinetic Chromatography in an Aggregated Lipid Environment: Effects of Size on Amyloid-β Protein-Lipid Integration

Aaron Stafford, John Brown University, Ralph Henry and TKS Kumar, mentors. Evolution of Signal Recognition Particle-based Protein Targeting

Tony Jude Award

The Tony Jude Award was created in 2002 to recognize a student or students for outstanding research. It is awarded in memory of a former REU student who returned to the University of Arkansas and obtained a doctorate degree.

This year’s award was given to two outstanding researchers. Casey Einfalt, from Rowlett, Texas attends John Brown University. His mentor this summer was Ingrid Fritsch. Autumn Webb, from Tillar, Arkansas is a student at the University of Arkansas at Monticello. Her mentor for the summer was Feng Wang. Incidentally, she was recommended for the program by Professor Andrew Williams, who received his Ph.D. from this department in 2009 under the direction of Bill Durham.
Student News

Nine students defended their MS thesis or PhD dissertation during the months of June and July. They are listed in order of their defense dates.

Samir Jenkins
Jingyi Chen
“Surface Modification of Noble Metal Nanostructures toward Biomedical Applications”
June 16

Haibin Wu (MS)
Jingyi Chen
“Synthesis of Palladium and Palladium-Copper Nanostructures as Electrocatalysts”
June 26

Barry Sharp
Matthias McIntosh
“Asymmetric Synthesis and Transition Metal Catalyzed Cross-Coupling Arylation of Selected Organolithiums”
June 30

Alda Diaz Perez (MS) (CeMB)
Julie Stenken
“Comparison of Different Modulators that Affect Macrophage Activation in vitro”
July 7

Ashley Howard
Colin Heyes
“Designing FRET Assays to Study Electrostatic Interactions Pertaining to the Binding of Intrinsically Disordered Peptides”
July 8

Adam Kreidermacher
Ingrid Fritsch
“Fundamental Studies of Magnetocconvective and Density Gradient Based in a Microfluidic Environment”
July 10

Randee McBride (MS)
Colin Heyes
“FRET Study of Ligand Binding and Exchange Kinetics on the Surface of CdSe/ZnS Quantum Dots”
July 13

Valerie McKinney (MS)
Julie Stenken
“In vitro Microdialysis Sampling Collection of Volatile Organic Compounds (VOC’s), Dodecafluoropentane (DDFP) and Isoflurane”
July 16

Kolawole Ayinuola
Matthias McIntosh
“Novel Azole-based Rearrangements”
July 17

Alumni Updates

Rebecca Simpson, BS 2013 under TKS Kumar, is now attending graduate school at Cornell University. She was excited to report that her NSF Graduate Research Fellowship Program Application was accepted.

Kolawole Ayinuola, PhD 2015 under McIntosh, has resumed his appointment with Sealed Air Corporation, a global leader in protective packaging solutions, as a Senior Scientist in the Technical Leadership Program. Therein, he will be a contributing member of the global R&D staff. He is presently in Danbury, CT and will subsequently undergo rotations in Duncan, SC. His final work assignment will be in Charlotte, NC, which will be the new headquarters and R&D base of Sealed Air.

Estelle Huff Nuckels, PhD 2009 under Pulay, reports that she received promotion to Associate Professor with Tenure, effective this fall, at Middle Georgia State University.

James Wear, BS 1959, MS in Physical Chemistry, and PhD 1962 in physical chemistry under Dr. Ed Amis checked in, as did Stephen Graves MD, who attended in 1967-70 and Bill Deese, PhD 1982.

After about 25 years, Dr. Brian Harrod recently retired from Albemarle Corporation, serving as Process Technology Advisor in the Specialty Chemicals Division at its Magnolia, Arkansas facility. The involved lab scale syntheses, analyses, and technical evaluations to support the commercial scale production of elemental bromine and organobromine compounds, including some flame retardants. Currently, Brian continues to provide technical support to Albemarle Corp. on a part-time consultancy basis. He completed his Ph.D. in organic chemistry at the U of A in 1990, under the direction of Dr. Norbert Pienta. His wife, Dr. Ellen Friday, is a technical director at the Feist-Weiller Cancer Center at the LSU Health Sciences Center in Shreveport, Louisiana. At the U of A, she completed her Ph.D. in biochemistry under the direction of Professor Roger Koepppe. Brian and Ellen reside in Minden, Louisiana.

Beverly (Davis) Meinzer is currently in her 12th academic year teaching Chemistry and Physical Science at the UofA Community College in Batesville and absolutely loves it! She’s also been working in the Academic Advising Center for the past year. She and her husband Alan live in Mt. Pleasant, AR, where he is Pastor of the Barren Fork Cumberland Presbyterian Church. On December 30, 2014, they celebrated their 25th wedding anniversary. Their daughter Natalie is a senior at Bethel University. Beverly was a PhD from 1989 under Dr. Roger Koepppe.

If you have something to submit, please visit the website Fulbright.uark.edu/departments/chemistry/alumni-and-friends.php We look forward to printing your tales!
Excellence in the Central Science

Calendar of Events

August
19 First year Graduate Student Orientation
24 Regular Session begins (ends Dec 18 (73 days))
25 First 8 - wk session begins (ends Oct 13 (37 days))
31 Seminar: Carol M. Taylor, LSU, 3:30 CHEM 105

September
04 Last day to drop a full semester class without a “W”
07 Labor Day holiday (office closed)
10 Department Picnic
15 Seminar: Oleg Larionov, UT San Antonio, 3:30 CHEM 105
21 Seminar: Qin Lin, University of Buffalo, 3:30 CHEM 105
28 Seminar: Zhihong Nie, University of Maryland, 3:30 CHEM 105

Lucas Whisenhunt and Eric Barber grade papers as part of their graduate student duties. They are getting very good at it.

The department of chemistry and biochemistry at the University of Arkansas strives for excellence in research, teaching and service in chemistry - the central science. We aspire to positions of leadership regarding the discovery of new scientific knowledge, the training of students, and the economic development of the State of Arkansas. We seek to recruit and retain a diverse group of the best faculty, students and staff to address the challenges of the future through interdisciplinary and multidisciplinary research and education.

Library Hours

Intersextion and Interim Hours: August 2 - 23

Regular Summer Hours
Saturday and Sunday CLOSED
Monday – Friday 8:00 am – 5:00 pm

Fall Semester Hours: August 23 - December 18
Saturday and Sunday CLOSED
Monday - Thursday 8:00 am - 9:00 pm
Friday 8:00 am - 6:00 pm

Exceptions to Regular Fall Hours
Monday Sept. 7 (Labor Day) CLOSED
Friday Oct. 16 8:00 am - 5:00 pm
Mon - Tues Oct. 19 - 20 (Fall Break) 8:00 am - 5:00 pm
Tues - Wed Nov. 24 - 25 8:00 am - 5:00 pm
Thurs - Fri Nov. 26 - 27 (Thanksgiving) CLOSED
Friday Dec. 18 8:00 am - 5:00 pm
Mon - Tues Dec. 21 - 23 8:00 am - 3:00 pm
Wed - Sat Dec. 24 - Jan 1 CLOSED

The department of chemistry and biochemistry library resources can be accessed in the following LibGuides: http://uark.libguides.com/content.php?pid=110953. Please bookmark for future use.
Theses and dissertation resources can be found on the following LibGuide: http://uark.libguides.com/content.php?pid=123035 &sid=1057466.

Department Unveils New Web Page

Office Manager Heather Jorgensen has worked closely with Ali Williams, Director of Creative Services for Fulbright College, to launch our new departmental web page, located at Fulbright.uark.edu/departments/chemistry/ There you will find links to departmental information, news, and people. But best of all, alumni can stay in touch through the Alumni & Friends link. We want our alumni to stay in touch! Please take a few minutes to browse the page and submit any update you’d like published (or not). We welcome pictures too!

Save the Date!

The 2015 INBRE conference will be held November 6-7 in Fayetteville, AR.