

DEPARTMENT OF CHEMISTRY NEWSLETTER

SPRING 2007

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SPECIAL POINTS OF INTEREST:

- TTU Chemistry graduates 25 undergrads in 2005—highest in the Tennessee Board of Reagents
- ACS student affiliate chapter ranked in the top 10% in the nation.
- Department receives more than \$1M dollars in federal research funds since 2005.

FROM THE OFFICE OF THE CHAIR...

Greetings from the Chemistry Department Chairs Office! After eight productive years as chair, Dr. Scott Northrup stepped down at the end of the 2004-2005 academic year. We'll miss him in the front office, but we're very happy that he decided to remain at TTU and resume a vigorous research program. After serving one year as interim chair, I became his permanent successor, and success is our goal in the chemistry department. You, as alumni, serve an even more important role than I, as you support and represent Tennessee Tech all over the world. Without you, no one would know about TTUChemistry.

The past two years has seen a great deal of activity in our department. We have hired

an additional analytical faculty member, Dr. Mona Wells; we have purchased several new instruments in support of research, remodeled a lecture hall, two research labs and one prep-room in Foster Hall, and hired a full-time laboratory coordinator, Mr. Gene Mullins who is also pursuing a master's degree in chemistry. In addition, we have awarded greater than \$40,000 in student scholarships over the past two years which wouldn't have been possible without your support.

Through a combination of federal and state dollars as well as donations from alumni, we have purchased several instruments for teaching & research in the

last two years. First was the purchase of a Varian FT-IR and last spring we purchased a Varian 3800 GC. This year, we are purchasing a Varian GS/ion-trap MS/MS and a Varian HPLC/triple quad MS. In addition, we are purchasing a Waters HPLC/MS time-of-flight spectrometer. Our students will be able to gain exposure to some of the most advanced instruments available putting them one step ahead of graduates from other institutions.

Letter continued on page 3



ROBERT GLINSKI STUDIES THE RED RECTANGLE

Can studying the molecules surrounding a very old and dying star unlock information about the chemical story of life's origins? According to **Dr. Bob Glinski** it can. Dr. Glinski's current astrochemistry focus is on the Red Rectangle, an unusual nebula that appears as a glowing red X-shaped

structure through NASA's Hubble Space Telescope. **Dr. Glinski**, along with senior Chemistry major **Phil Michaels**, is studying the molecules that emit light of their own from along the X-shaped bars of the Red Rectangle. According to Glinski, these molecules are in a unique place in space, and

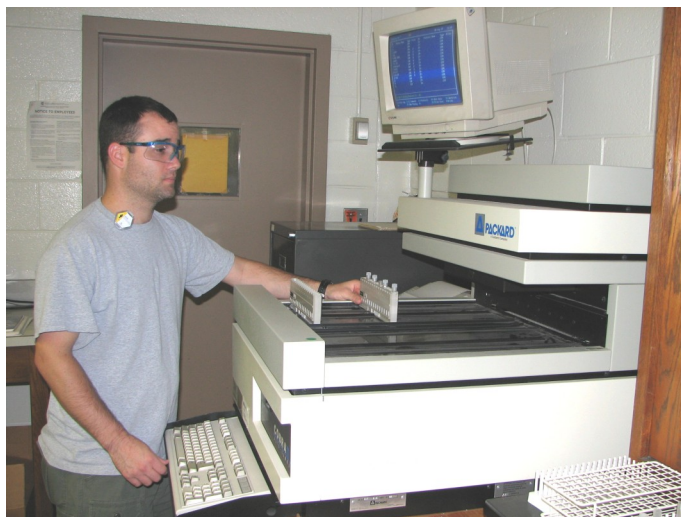
only a few have been identified. "My work may seem arcane, but these molecules that light up in space are fun to study because you can measure the different characteristics of the different wavelengths of light and try to identify a molecule specifically," says Glinski.

Story continues on page 2

BEN HARMON WINS THE VOGT AWARD IN RADIOCHEMISTRY

Ben Harmon became the first TTU student to receive a national radiochemistry award from the American Nuclear Society. "I was surprised. I didn't think I had a shot at it," said Harmon. Dr. Dale Ensor, his research advisor, commented, "Ben has excellent lab techniques and was able to start taking distribution data al-

most immediately upon starting the project." The project, mostly carried out at TTU, was a collaborative effort with the ORNL Chemical Separations Group. Ben presented the results of his study at the Fourteenth Symposium on Separation Science and Technology for Energy Applications held in Gatlinburg in October 2005.



TTU CHEMISTRY RECOGNIZED FOR EXEMPLARY INSTRUCTION

General Chemistry at TTU receives national recognition by the Center for Education Policy Research (CEPR) of the College Board.

Led by Drs. Scott Northrup, Thomas Furtsch and other faculty, the TTU general chemistry program has been transformed over the past several years.

Courses taught at institutions across America were

studied in an effort to determine how best to redesign AP courses.

The study sought to identify best-practice college courses that could inform the redesign of AP chemistry courses taught in high schools. The goal of the redesign process is to ensure that AP courses reflect the best of college teaching.

To identify best practices courses, CEPR 1) assem-

bled a panel of national experts to analyze top courses from a wide range of institutions, 2) reviewed the nominated courses and 3) identified the critical components of best practices present in each course.

Dr. Scott Northrup's course received further review that resulted in specific elements of this course being designated as exemplary.

"Dr. Scott Northrup's course in Gen. Chem. received further review that resulted in specific elements of this course being designated as exemplary."

RED RECTANGLE...CONTINUED FROM PAGE 1



Photo courtesy of NASA

"There aren't too many molecules you can identify in space from their light emission in visible wavelengths."

What Glinski describes is called a molecule's "spectroscopic signature," and researchers have found some signatures they have not been able to link to specific molecules. It is not clear which mole-

cules create the striking red color of the rectangle. Dr. Glinski is studying a very narrow set of colors in the light spectrum to help him learn about the material that has remained unidentified for more than 25 years.

He is one of a small number of chemists in the world in the growing field of astrochemistry. Based

on his scholarly publications, Glinski was nominated and elected a member of the International Astronomical Union.

In collaboration with Chris Anderson, a professor of astronomy at the University of Wisconsin-Madison, Glinski employs the world-class WIYN telescope located on Arizona's Kitt Peak.

DR. MONA WELLS' GROUP DOES EUROPE...AGAIN!

For the second summer in a row, Dr. Mona Wells conducted research in Europe, and once again, provided summer research experiences for both a graduate student and an undergraduate chemistry major.

TTU Chemistry Master's student Daniel Hardison is engaging in research at the forefront of device technology that shows excellent potential for novel applications in medical disease diagnosis. Mr. Hardison spent the summer of 2006 con-

ducting research work with collaborators at the École Polytechnique in Paris, the premiere French institution for training in engineering, where he was working on fabrication of new types of nano-scaled electronic devices. By fabricating such small devices with structures as small as a nanometer (one billionth of a meter), a clear electronic signal is obtained. By chemically modifying the surface of such electronic devices, sensors may be developed that have much greater

sensitivity to chemicals of interest than can be obtained with standard methods of chemical analysis. This has important implications, especially to the area of cancer treatment, where early diagnosis is highly beneficial for patients, and depends on the ability to detect very low quantities of tumor markers in blood or tissue. Mr. Hardison's work abroad represents the first personnel exchange in collaborative efforts between TTU

Story continues on page 5



FROM THE CHAIR... CONTINUED FROM PAGE 1



Because of the donations received from alumni, we've also been able to remodel key rooms in Foster Hall. First, largely through donations by John and Deloris Clayton with matching funds from Schering Plough, we remodeled both the large lecture room and the organic prep-room. The lecture hall is now a 21st century classroom offering the finest in teaching technology.

In addition, we've also remodeled one laboratory for Environmental Forensics research and a sec-

ond small lab for overflow instrumentation in the TTU Center for Structural Chemistry. As donations are made, we'll continue to remodel more of the building and create the atmosphere conducive for the research and teaching needs required in the new millennia. We want to thank each of you that has contributed towards helping us meet our goals.

As you are aware, state support for higher education has been getting worse over the last decade. The advent of the lottery has helped some students, but does not help the department in defraying its costs in providing the undergraduate research experiences so vital for our students. While our newly formed Chemistry Department

Advisory Board will be helping us raise funds, we'll need help from you as well. Many of our students are working outside the university to finance going to school. Our long-term goal is to pay them that same amount of money to work *on campus learning chemistry!!!* That is why your support of the chemistry department endowments are so important!! In closing, I'd just like to say thank you and hope that this newsletter finds you all doing well. Stop by and see us if you are in the area as we enjoy keeping in touch. We'll always be here to welcome you home.

Sincerely,

Jeffrey O. Boles, Chair

Department of Chemistry

"Since July 1, 2006, the chemistry department has received \$1.02 million dollars in federal grant funds"



Rachael Jernigan ('06) now attends pharmacy school.

DR. BARBARA JACKSON WINS ANOTHER AWARD!

Dr. Barbara Jackson defines “professional service.” We discovered this earlier this year when she was selected for the 2006 Outstanding Faculty Award for Professional Service. After a lucrative career as a research biochemist, Barbara turned her attention to both teaching excellence and professional service.

This decision did not come lightly, and was driven by her heart for both the students and the public at large. Her teaching efforts resulted in her winning the Outstanding Teaching Award in 1996, and we

are not surprised that she has been selected for this award a decade later.

One of the reasons she is deserving of this award is her involvement in the methamphetamine problem in Tennessee. She has used her professional and personal background as a biochemist, a teacher and a screenwriter in order to educate the public about the dangers of methamphetamine. She proposed and administered educational activities, such as the Meth Awareness Competition, where students at all grade levels in Putnam

County presented posters, essays, and dramatic musicals at several venues in 2004.

The best posters, etc., were included in a “Meth is Death” CD. That was still not enough for Barbara. When the District Attorney received a grant in 2005, Barbara convinced him to fund a short-film project on Meth addiction from a kid’s point of view (*Forgotten Son*, DVD). This is being incorporated into a larger project that will likely be sent nation-wide, as this is a growing problem in America.



Dr. Barbara Jackson

MEET GENE MULLINS!

In the summer of 2005 we added a new member to the TTU Chemistry family; Mr. **Gene Mullins** (BS '79). Gene is an industrial chemist with 20+ years of experience. He oversees the undergraduate laboratory instruction in our department by training and scheduling teaching assistants, overseeing, managing and organizing the chemical stockroom, assisting faculty with teaching and research needs

and assisting with the care and maintenance of our instrumentation.

In his spare time he’s also a second term county commissioner. If that isn’t enough to keep him busy, he’s also in the chemistry M.S. program and will likely graduate in 2007.

Gene worked for Fleetguard, Inc. from 1979 to 2004. His responsibilities there included research and development in elas-

tomers, polymers, filtration media, and instrumental analysis of engine fluids and filter materials.

Gene has been a valuable asset to the department since he joined us last year and we are truly blessed to work with him. I’m sure many alumni from the late 1970’s will remember Gene.

In his spare time, Gene also races his red & white MGB.

“Dr. Jackson’s short film, *Forgotten Son*, recently took first place at the International Family Film Festival in Los Angeles”



WELL'S GROUP (CONTINUED FROM PAGE 3)

Chemistry and the École Polytechnique de Paris.

Another once of Dr. Wells's students, undergraduate researcher Maia McNabb, is also working in the area of sensing, having spent the summer of 2006 at Germany's prestigious Center for Environmental Research, a Helmholtz center of excellence. Her research focused on understanding the molecular basis for cellular signals that result from exposure to toxins, in particular environmental toxins such as arsenic. The approach involved using proteomics and flow cytometry to understand the inner workings of cells, including genetically modified sensor bacteria used in the research of her advisor, Dr. Mona Wells. Proteomics is an advanced technique in which proteins of interest in a cell are first purified by

two-dimensional gel electrophoresis, and then analyzed for chemical structure by liquid chromatography-tandem mass spectrometry.

In collaboration with one of the world's top developers of genetically engineered biosensors, TTU's Mona Wells is leading an international collaboration focused on public health threats posed by endocrine disrupting compounds. Dr. Wells, Assistant Professor of Chemistry, and Dr. Shimshon Belkin, of the Hebrew University of Jerusalem, recently received a \$280,000 grant to support their research.

Their work will investigate the development of sensor panels that exploit the ability of genetically engineered whole-cell biosensors to sense endocrine disrupting chemicals. The body's endocrine system

controls many important physiological processes, including reproduction. The planned collaborative work on endocrine disruptors will utilize living bacterial biosensors, genetically engineered to produce a particular optical signal in response to different types of stimuli, and, since they are living, they offer a unique chance to study different types of biological effects with relevance to homeland security and public health. Biosensor response will be analyzed with artificial neural networks, a highly sophisticated method for analysis of complex data that mimics the natural neural network of the human brain. In addition to the research value, over a three year period the award will also fund student training and international research experiences in this cutting-edge area of science.



"TTU's Mona Wells is leading an international collaboration focused on public health threats posed by endocrine disrupting compounds"

SWARTLING & KLINE WIN 2005-2006 AWARDS

Daniel J. Swartling has the unique ability to motivate and challenge while simultaneously earning the respect and admiration of his students which led to his winning the 2005 Outstanding faculty award in Teaching. Swartling earns the respect and admiration of students by a combination of teaching with unconventional methods, presenting exciting chemical demonstrations in a

way that teaches difficult material as simply as possible, and offering an "open door policy" that makes him universally approachable to students. Swartling joined our faculty in 1994 and holds a doctorate in Organic Chemistry from the University of North Dakota. **Eugene Kline** recently performed a singular service activity by working with Gov. Phil Bredesen's office

that could ultimately curb the production of methamphetamine in Tennessee. In addition, Kline is an enthusiastic adviser of our Health Sciences Pre-professional program. These activities led to his selection of the 2005 Outstanding Faculty Award for Professional Service. Kline joined our faculty in 1973 after earning a doctorate in Organic Chemistry from Iowa State University.



AWESOME ALUMNI

Avijita Jain (MS '05) says hello to all of her friends from Blacksburg, VA. Where she is working on a Ph.D. in Chemistry at Virginia Tech. "I'm doing well and I miss you all," says Avi.

Carie (Harrington) **Fortenberry** (BS '04, MS '06) has joined the Jens Meiler group in the Vanderbilt Department of Chemistry Center for Structural Biology. Her research involves the computational and experimental redesign of protein structure in the fight against antibiotic resistance.

Carley Chandler (BS, '02): After completing her Ph.D. in organic chemistry at the University of Colorado in August, 2006, Carley has now started a post-doc at the Mulheim an der Ruhr Max-Planck Institute in Germany. Tell everyone that I said hello, or 'guten tag' which means 'good day' in German.

Casey (Narrie) **Bassette** (BS '96) is moving from the University of Montevallo in Alabama to become a faculty member at the DeBusk College of Osteopathic Medicine near Knoxville, Tennessee.

Casey and her husband Dan have two children, Avery (7) and Cadence (4), four cats, one dog and two rats.

David Sullivan (BS '01, MS '03) works as an R&D sulfur chemist for Oxigent. He and his wife Janet recently purchased a home in NW Putnam County.

David O'kin (BS '96, MS '98) works for Invetrogen (formally Molecular Probes) and informs us he is a member of the Separations Group in Organic Production. He and his wife Ramona have two children; Caylin (10) and Lucas (5). David writes "We drove through Cookeville last summer. It sure has grown and I sure miss living there. I don't know what it is about Cookeville that makes me want to live there. We have lived in Eugene for 8yrs, but it's still doesn't feel like home.

Duane Hatch (BS '01, MS '03) is pursuing a Ph.D. at the University of Cincinnati after working for a year at Los Alamos National Laboratory. "Hatch" is doing well and informs us that he won the Organic Division Graduate Student of the Year award this year

(\$1000), and in doing so he "beat out a lot of senior students."

Huifang (Bella) Yao (MS '04) is at UTK developing HPLC-ESI-MS/MS methods to probe the structure of the amyloid fibrils associated with Alzheimer's and related diseases under Dr. Kelsey Cook. "Bella" is in her second year working towards a Ph.D and wants everyone to know she, her husband and son are all doing well.

Jim Henderson (BS '99, MS '01) has recently earned his Ph.D. from the University of Colorado in Organic Chemistry and is now a Post-doc at Harvard University.

Katie McClendon (BS '01) received her Ph.D. from Vanderbilt in 2006 and is now a post-doc in Erik Knudsen's lab in the department of Cell and Cancer Biology at the University of Cincinnati.

Laurel (Ray) Morton (BS '99) went to Europe over the summer with her husband Sam exploring Scotland and Ireland. She is now back at Villanova teaching undergraduate inorganic lab and conducting research.

Timothy Cofer (BS '99, PhD '04) tells us that he has moved from Pine Bluff, Arkansas to Tooele, Utah, outside Salt Lake City, to become a lab supervisor with TVA. He says "it's beautiful in Utah and wishes us all well."

Send your **Awesome Alumni** notes to us so we can tell everyone what you've been up to lately!
(Jboles@tntech.edu)

Samantha Bessette (BS '05) is hard at work at USC where she is working towards earning the Ph.D. "I'm working with an oxidant protein human superoxide dismutase-1 and how mutations in this protein can lead to the development of Lou Gehrig's disease. But the real update is that I have completed my research plan and defended it." Kudos to "Sam" from all of us at TTU

ALUMNI GIVING

Private gifts are an important reason that Tennessee Tech Chemistry is the outstanding department that it is today. Gifts from alumni, friends, faculty and staff, students, and private companies have enabled the department to outfit 21st Century Classrooms, purchase current instrumentation and award scholarships on an annual basis. These additional enhancements and opportunities make TTU Chemistry more attractive to students and have contributed to our

increasing number of majors. None of this would have been possible without your generous and often continuing support. There are a variety of giving opportunities available to you as a friend or alumnus of the chemistry department. The back of the newsletter shows you simple and easy ways to give. You can also contact us if you have questions. Although there are guidelines and laws to be considered, the university is allowed to accept any lawful and nondiscriminatory

gift that promotes our mission and for which there is no expectation of return or compensation. We are currently renovating much of Foster Hall, purchasing new equipment, and funding undergraduate and graduate research with funds donated by alumni and friends. These needs increase annually, and without your support, we cannot meet many of these needs. You, as a member of the TTU family, serve a vital role as we continue to grow in both reputation and number.

“The role you play in giving cannot possibly be underestimated. It motivates us and provides opportunity for greater success.”

NAMED SCHOLARSHIPS

Vernon R. Allen Memorial: Dr. Allen taught Chemistry for 30 years, retiring in 1994.

Howard G. Ashburn Memorial: Dr. Ashburn taught organic chemistry for over 30 years and served as Chair for the last 10 years.

Robert L. Sublett: Dr. Bob was our pre-professional advisor and served as chair for 14 years before retiring in 1987.

Ferris U. Foster Memorial: Dr. Foster was the original chair and the building is named in his honor.

J.P & Willie Rush Jewell: Prof. Powell Jewell taught chemistry and advised allied health majors.

John Skinner Memorial— Dr. Skinner taught chemistry for over 20 years in biochemistry and freshman chemistry.

McDowell-Blankenship: Dr. Jack McDowell, a TTU alumnus, started this scholarship in memory of his aunt Lela McDowell Blankenship who provided him and others money to attend TTU.

Leroy Harkins Memorial: Started by Eleen Harkins, the first woman to graduate from TTU chemistry in memory of her husband who opened the first medical lab in Cookeville.

Kline Undergraduate Research: Established by Ruth Ann and Eugene Kline in support to support basic research in order to help students develop essential skills necessary for a variety of careers. Ruth passed away Christmas Day, 2005 and Gene continues at TTU advising & teaching organic.

William L. Harper Chemistry Scholarship: Bill Harper (Chem '51) established this scholarship to aide Morgan County area chemistry majors pursue their undergraduate degree.

Alvin W. Boyd Memorial: Started by Julia G. Boyd in memory of her husband, who operated a pharmacy in Cookeville for 35 years.

Other related named endowments include the **Headrick** PreMed Scholarship and the **Joseph Bedford Hix** memorial scholarship for preprofessionals.

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W E ' L L T A K E Y O U T H E R E

GIVING

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| <input type="checkbox"/> Robert Swindell- Barbara Jackson Undergraduate Research Endowment | <input type="checkbox"/> Chemistry Colloquium Endowment |
| <input type="checkbox"/> Named Scholarship Endowment _____ | (see page 7) |

Clip out and mail to: Dr. Jeffrey O. Boles, Department of Chemistry, Tennessee Tech. University, Cookeville, Tn 38505-0001