

Eastern Michigan University

Department of Chemistry Newsletter

Spring 2009

Breaking New Ground!



On November 18th of 2008, EMU President, Susan Martin and members of the EMU Board of Regents, accompanied by state and community officials, officially broke ground on the new EMU science complex. The centerpiece of the \$90 million facility will be a complete new 72,000 sq ft, three story addition. The finished science complex will contain state-of-the-art teaching and research labs which will aid in the fostering of closer ties and interdisciplinary research between faculty members from all five EMU science departments. The architectural firm of Lord, Aeck and Sargent, of Ann Arbor, designed the complex to include several distinctive features that will serve as a 'doorway' to the EMU campus, including a spherically shaped classroom, a pedestrian bridge that will connect the west parking lots to the science complex and an entry atrium that will serve as a gateway and pass-thru from the west parking lots to the campus center. In addition to the new structure, the existing 180,000 square foot Mark Jefferson Building will be completely refurbished.

One of the speakers during the ceremony was Jim Grinias, an EMU senior who plans to pursue graduate studies in analytical chemistry and eventually become a professor. Jim stated, "Because of this dedication and groundbreaking, I am excited to see that steps are continuing to be taken to give our science departments the resources and facilities they need to truly achieve their highest goals."

The renovations will include a new mechanical system, serving the whole complex, that will dramatically reduce energy consumption and costs; a "green" roof; and the main pedestrian pathway will include a rain garden, which will help filter and detain storm water runoff and will provide a teaching opportunity for sustainable design, as will the green roof.

After the end of the fall 2008 semester, contractors for the Science Complex project began preparing the site for the start of construction activities. Over the holiday break, construction fencing, gates and temporary barricades were placed to separate the construction area from public parking areas and pedestrian routes. These temporary protective measures are expected to be in place until the anticipated completion of the whole project in 2011. Construction activities began in earnest over spring break with the demolition of the existing loading dock, work beginning on relocating underground utilities, and tree removal and site clearing.



BREAKING GROUND: During a groundbreaking ceremony for the new science complex Nov. 18, EMU President Susan Martin (above, middle) and the Board of Regents turned some dirt in a sandbox built for the occasion. (above, from left) Regents James Stapleton, Mohamed Okdie, Roy Wilbanks, Thomas Sidlik, Floyd Clack and Fran Parker put their shovels to good use.

Student Travel 2008



Geneve Maxwell, Melissa Doolin, Mary Ellen Ellis, Ruth Ann Armitage (faculty advisor), and Daniel Fraser in front of Palazza Pubblico (town hall) in Siena, Italy.

In [May](#), three EMU chemistry students -- Mary Ellen Ellis, an M.S. student from Farmington Hills; Melissa Doolin, a 2008 professional chemistry graduate from Novi; and Geneve Maxwell, a senior from Belleville -- traveled to Siena, Italy to present posters on their research at the 37th International Symposium on Archaeometry. In addition to their presentations, they toured the medieval city and attended a reception and concert as part of the conference. Melissa says, "The most memorable experience was hearing the six thousand pipes of the organ in Siena's gothic cathedral after hours, an opportunity I would not have had as a typical tourist." Geneve adds, "Presenting my research at the ISA meeting in Siena was the highlight of my college career."

ACS National Meeting - New Orleans, LA, March:
Fatmagul Tuluoglu (Advisor: Professor Lindsay)
Louis Lello, Mark Lukowski, Patrick Spoutz, and Claire Tornow (Advisor: Professor Milletti)

ACS Central Regional Meeting - Columbus, OH, June:
Paul North and Jennifer Vogel (Advisor: Professor Emal)
Balakrishna Kurva (Advisor: Professor Heyl-Clegg)
James Grinias (Advisor: Professor Holmes)
Andrew Livingston (Advisor: Professor Milletti)

ACS National Meeting - Philadelphia, PA, August:
Kristi Henricks and Jennifer Vogel (Advisor: Professor Emal)

Graduate Research Fair 2008

The 2008 Graduate Research Fair was held in the Student Center on March 24, 2008. Once again, all of our graduate student presenters made the department proud as they showcased some of the cutting edge research currently underway at Eastern. The presenters were:

Roshini Fernando

Professor Hedeel Guy Evans

Probing the Mechanism of Activation of Dihydroorotase by Aspartate Transcarbamoylase in Aquifex Aeolicus

Andrew William Gray

Professor Deborah Heyl-Clegg

Synthesis and Dye Leakage Assay of Human Islet Amyloid Polypeptide 10-19 with Inhibition by Insulin 13-18

Balakrishna Kurva

Professor Deborah Heyl-Clegg

Synthesis and Purification of HLVEALYLV, an Insulin-based Inhibitor for Human Islet Amyloid Polypeptide (hIAPP)

Meenal Mhaskar

Professor Hedeel Guy Evans

Protein-Protein Interactions between the Multifunctional Protein CAD and Protein Phosphatase 1

Vasumathi Molugu

Professor Steven Pernecky

Determination of Microbial Metabolites in Rat Cecal Fluid by GC-MS

Swathi Ramaraju

Professor Deborah Heyl-Clegg

Pentapeptide Inhibitors of Human Islet Amyloid Polypeptide as Potential Treatment for Type II Diabetes

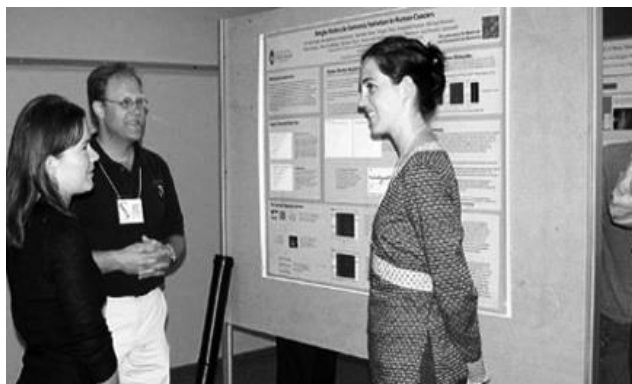
Fatmagul Tuluoglu

Professor Harriet A. Lindsay

Synthesis of the Bicyclic Core of Pyrrolizidine and Indolizidine Alkaloids

Undergraduate Symposium 2008

The 28th event was the largest in the history of the symposium, featuring 178 oral presentations and 75 posters. More than 300 students presented under the guidance of 150 faculty sponsors. Once again, chemistry was well represented in both the oral presentation and poster sessions.



Poster Presentations

- **Brian Claxton**
Professor Harriet Lindsay, sponsor
Multistep Synthesis of Biologically Important Natural Products
- **Melissa Doolin**
Professor Ruth Ann Armitage, sponsor
GC-MS Analysis of Possible Binders in Rock Paintings
- **James Grinias**
Professor Ross Nord, sponsor
The Identification of Phosphorylation Sites in Raf and SIRT2 Proteins with FT-ICR-MS
- **Louis Lello**
Professor Maria Milletti, sponsor
Calculation of Rotational Barriers for Two Iminium Cation Stereoisomers
- **Geneve Maxwell**
Professor Ruth Ann Armitage, sponsor
Little Lost River Cave, Idaho: Characterization of Black Residue and Implications for Radiocarbon Dating
- **Paul North and Nicolas Stoyanovich**
Professor Cory Emal, sponsor
Design and Synthesis of Polyphenolic Inhibitors of Plasminogen Activator Inhibitor-1
- **Josh Osborne**
Professor Arthur Howard, sponsor
An Approach to the Synthesis of Aza-Alkaloid Skeletons
- **Kyle Lauren Poulsen and David Michael McDiarmid**
Professor Hedeel Guy Evans, sponsor
Interaction of Mammalian Protein Phosphatase 1 with the Multifunctional Protein CAD
- **Khizer Sikander**
Professor Ruth Ann Armitage, sponsor
Evaluating Plasma-Chemical Oxidation as a "Non-destructive" Preparation Method for Radiocarbon Dating Archaeological Textiles

- **Patrick Spoutz**
Professor Maria Milletti, sponsor
Analysis of Torsional Effects and Ring Flipping in Heavily Substituted Oxazolidine Rings

- **Janine Van Gemert**
Professor Ruth Ann Armitage, sponsor
Characterization of a Use Residue on a Unique Stone Tool from the Coahuila Desert

Oral Presentations

- **Andrew Francisco**
Professor Larry Kolopajlo, sponsor
Computer Animations for Use in Teaching Chemistry
- **James Grinias**
Professor Heather Holmes, sponsor
Temperature and Pressure Effects on Tunable Selectivity for Gas Chromatography
- **Andrew Livingston**
Professor Ruth Ann Armitage, sponsor
THM-GC-MS Analysis of Rock Paintings at la Casa de las Golondrinas, Guatemala
- **Mark A. Lukowski**
Professor Maria C. Milletti, sponsor
Kinetic Aspects of the Oxygenation Reaction Mechanism in COX-1

- **Brooke D. Raven**
Professor Harriet A. Lindsay, sponsor
Synthesis of the Bicyclic Core of Indolizidine and Pyrrolizidine Alkaloids
- **Claire Tornow**
Professor Maria C. Milletti, sponsor
Comparing the Thermodynamic Stability of Diene Radicals: A Model for the Peroxidation of Arachidonic Acid
- **Jennifer Vogel**
Professor Cory Emal, sponsor
Efforts Toward the Total Synthesis of Tannic Acid



Student Awards 2008

Bert W. Peet Scholarship Awards

ACS Huron Valley Section Undergraduate Award

American Institute of Chemists Award

Maurice Decoster Endowed Chemistry Scholarships

Collins' Endowed Scholarships in Chemistry

Sandra J. Lobbstael Chemistry Endowed Scholarship

Elva Mae Nicholson Organic Chemistry Endowed Scholarship

Hypercube Scholar Award

John Sullivan Endowed Scholarship

Biochemistry Achievement Award

Mark A. Lukowski

Claire E. Tornow

Melissa A. Doolin

Julie L. Carey

Geneve M. Maxwell

John R. Heemstra

James P. Grinias

Louis A. Lello

Jennifer J. Vogel

Vanessa R. Porter

Kristi L. Henricks

Patrick M. Spoutz

Kristi L. Henricks

Joshua M. Osborne

Student Awards 2008



Toxicology Achievement Award
Wiley Organic Achievement Award
POLYED Outstanding Achievement in Organic Chemistry Award
John J. Contario Analytical Chemistry Award
ACS Division of Analytical Chemistry Award
CRC Press Freshman Chemistry Achievement Award
Perry S. Brundage Scholarships

Donald B. Phillips Memorial Endowed Scholarship
Huron Valley Publishing Scholarships

University Honors Program Graduates

Senior Thesis/Project and Symposium Awards

Symposium Undergraduate Research Fellow Award
Honors Undergraduate Fellowships

EMU Chemistry Department Teaching Assistant Award
EMU Chemistry Department Research Award
ACS Huron Valley Section EMU Outstanding Graduate Student Award
Ronald M. Scott Memorial Scholarship
Dean's Award for Research Excellence
Graduate Research Fair Sigma Xi Award
University Fellowship

Karen L. Sanders
 Seo Jin Oh
 Patrick M. Spoutz

Paul R. North
 Melissa A. Doolin
 Anna M. Bauman
 Anna M. Bauman
 Lindsey R. Kolar
 Andrew L. Walla
 Emily R. Palmer
 Kristi L. Henricks
 Michael A. Kallio
 Melissa A. Doolin
 Mark A. Lukowski
 Claire E. Tornow
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 Brian S. Claxton
 Melissa A. Doolin
 James P. Grinias
 Louis A. Lello
 Mark A. Lukowski
 Brooke D. Raven
 Patrick M. Spoutz
 Claire E. Tornow
 Jennifer J. Vogel
 Rohini Sidhu
 Fatmagul Tuluoglu
 Roshini S. Fernando
 Nadine C. El-Ayache
 Shyamprasad Samisetti
 Meenal A. Mhaskar
 Nadine C. El-Ayache

Development News

Kresge Donation

The Chemistry and Biology Departments are involved in a challenge grant from the Kresge Foundation. Three years ago, we received a Kresge grant of \$250,000 to purchase new equipment, and the challenge is to raise a total of \$1,000,000 to create an endowment to maintain and replace this equipment. So far, \$775,000 has been raised, including a corporate donation of \$500,000 in spring 2008. Efforts are still underway to reach the challenge goal. When the goal is reached, it will result in an additional match of \$250,000 from the Kresge Foundation. We greatly appreciate the support of the EMU Foundation and friends, such as former EMU regent Michael Morris.

Pfizer Donation

Pfizer Corporation announced in early 2008 that it was closing its R&D headquarters in Washtenaw County. While this was certainly bad news for our department and the local economy, there was a silver lining as the closing did provide a valuable influx of equipment to EMU. The Pfizer Corporation found it no longer needed many items of surplus glassware, pumps and even larger items such as spectrometers and G.C.'s as it moved materials from its Ann Arbor facility. The materials were distributed amongst the faculty of both the Departments of Chemistry and Biology. These items will no doubt be put to good use in our teaching and research labs. Thank you, Pfizer, for your kind donation!

Faculty Activities



FULBRIGHT FELLOWSHIP

Hedeel Evans received a **Fulbright Fellowship** to travel to Europe for research collaborations stemming from her work in proteins. She is currently working at Institut Curie in France with her sponsor, Bruno Goud. The collaboration hopes to answer questions regarding centrosome, an organelle that is involved in cell division. This process is highly deregulated in tumor cells and understanding how it works can eventually lead to the development of chemotherapeutic agents. This work was also supported by a Faculty Research Fellowship for winter 2009.

SABBATICAL LEAVE

Krish Rengan spent fall 2008 semester on a 100% release time FRF award to continue his work on chemical reactions related to the disposal of radioactive waste generated from nuclear power. This work is part of his continuing collaboration with Professor Prussin of Nuclear Engineering department at UC Berkeley and collaborators at Lawrence Livermore National Laboratory.

AWARDS

- **Heather Holmes** was the recipient the 2008 Distinguished Alumni Award from the Honors College.
- **Heather Holmes, Raymond Hough, Vance Kennedy** and **Harriet Lindsay** were nominated for Faculty Appreciation Awards in 2008 by the Holman Learning Center.
- **Don Snyder** received an FRF SS&M award for \$2705 in support of his ongoing research. Don also received an FRF for release time during the Spring/Summer terms, 2008.
- **Ruth Ann Armitage** received a Faculty Research Fellowship for release time, and \$3000 in support, for the winter 2009 semester.
- **Tim Brewer** and **Larry Kolopajlo** received \$1249 for a successful eFellows proposal to enhance student 'involvement' in chemistry.

GRANTS

Chemistry Professor **Nina Contis** is a CoDirector on a successful \$900,000 grant that was obtained by the Honors College. (James Knapp is the project Director.) As a result, the Honors College has obtained funding from the Robert Noyce Teacher Scholarship Program in the Division of Undergraduate Education, National Science Foundation, to establish a new program called Developing Urban Education Teachers in STEM subjects. The general outcomes of the Program will be to (1) increase the number of secondary education STEM majors graduated and placed in high-need school districts, (2) increase the retention of new in-service secondary STEM teachers in high-need school districts and (3) increase secondary STEM teacher effectiveness in the classroom by pairing EMU's successful Urban Education Program with its recently-established Creative Scientific Inquiry Experience (CSIE) program.

Cory Emal has been awarded a \$220,000 subcontract as part of a five-year National Institute of Health grant to the University of Michigan. Professor Emal's work involves the design and synthesis of molecules that could be beneficial in the treatment of thrombosis and atherosclerosis. The role of these molecules is to interfere with the inactivation of an essential human enzyme involved in maintaining the good health of the circulatory system. So far, thirteen EMU students have been involved in this project.

FACULTY SEARCH APPROVED

The department is looking to add to the faculty ranks with the approval of a search for a faculty candidate with a specialization in analytical biochemistry. It is expected that the new member of the department will assist in both the teaching of biochemistry courses and increasing the level of biochemistry research activity. Specifically, with a background in analytical chemistry, it is also anticipated that the candidate will assist in the training of students in the use of instrumental methods for the measurement of biological processes. The search has yielded several excellent candidates who were invited for on-campus interviews. We hope to have the entire process successfully completed sometime in March.

PUBLICATIONS

Student co-authors are underlined.

A. J. Livingston, E. Robinson, and R. A. Armitage
"THM-GC-MS Analysis of Rock Paintings from Casa de Las Golondrinas, Guatemala: Implications for Radiocarbon Dating" *Int. J. Mass Spec.*, in press.

Christopher Bigge *et al.* "Effects of modifications of the linker in a series of phenylpropanoic acid derivatives: Synthesis, evaluation as PPAR alpha/gamma dual agonists, and X-ray crystallographic studies". *Bio & Medicinal Chem.* 2008

Hedeel Evans, Roshini Fernando, *et al.* "Dihydroorotase from the hyperthermophile, Aquifex aeolicus, is activated by stoichiometric association with aspartate transcarbamoylase and forms a one pot reactor for pyrimidine biosynthesis" *Biochemistry*, in press.

Hedeel Evans, Roshini Fernando, *et al.* "The sole Serine/Threonine Protein Kinase and its cognate phosphatase from Aquifex Aeolicus Targets Pyrimidine Biosynthesis", *Molecular Cellular Biochem.*, 311(1-2): 199-213.

Tim Friebe *et al.* "Synthesis of tert-Alkyl amino hydroxy carboxylic esters via an intermolecular ene-type reaction of oxazolones and enol ethers" *Organic Letters*. 2008.

Tim Friebe *et al.* "Nuclear Factor- κ B Mediated Inhibition of Cytokine Production by Imidazoline Scaffolds", *Journal of Medicinal Chemistry*, in press.

Junhwa Shin, Young Chang Nho, Arthur S Howard, "Approaches to the Syntheses of Partially Reduced Imidazo[1,2-a]pyridines", *Bull. Korean Chem. Soc.*, 29(10): 1998-2004.

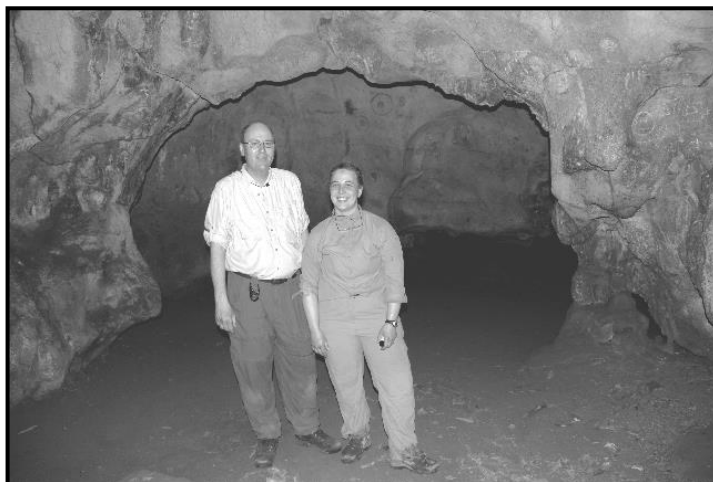
Amy Flanagan-Johnson and Sandra Rutherford, "Transfer of Knowledge in Science Courses for Elementary Education Majors", *J. College Science Teaching*, in press.

H.C. Griffin and K. Rengan, "Quantitative gamma-ray spectroscopy of NP237-239", *J. Radioanal. Nucl. Chem.* 276, 731.

Don Snyder, "Impedance Resonance: a Novel "Technique for Signal Acquisition from Interdigitated Electrodes (IDE) in Sensor Applications" *IEEE Sensors Journal*, in press.

Central American Adventures!

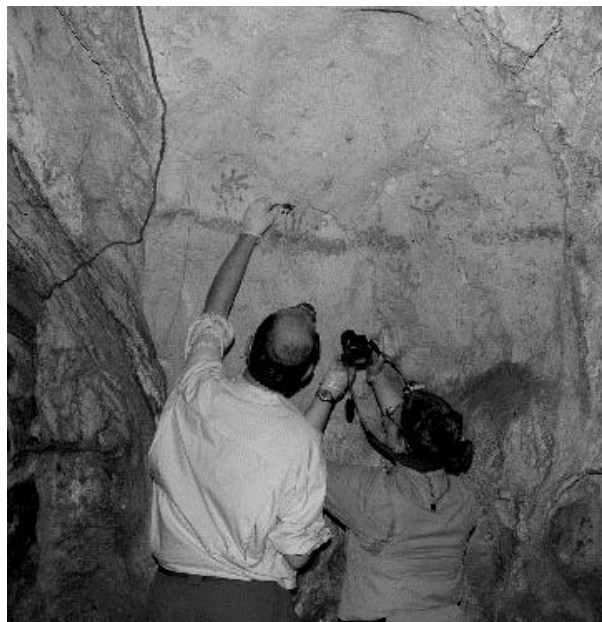
In January 2009, the Chemistry Department's very own Ruth Ann Armitage traveled to Nicaragua with a research team to study and collect samples at Cueva La Conga, Nicaragua. This location is the only known cave in the country of Nicaragua to have rock paintings and carved rock formations. The research team included Ruth Ann, her husband and former departmental chemistry instructor, Daniel Fraser, and archaeologist Suzanne Baker. The trip was partly made possible by a Faculty Research Fellowship that Ruth Ann received for winter semester.



Ruth Ann and Daniel standing in La Conga Cave

The site is extremely isolated in the northern part of Nicaragua where, unfortunately, little is known about the local archaeology or indigenous history. Although team member Suzanne Baker had previously visited the site in 2006 in order to make maps and photograph the paintings, this trip was the first opportunity for any official study of the Cueva La Conga site. The ultimate goal was to determine the age of the rock paintings and gather information to make cultural inferences about the native peoples that made them.

After receiving permission from the National Cultural Institute in Managua, the team drove several hours to the town of Waslala, passing through much of the famous coffee growing region of Nicaragua. While in Waslala, the team met with a local missionary, Pablo Yoder, who first found out about the site in 2004 after hearing about it from local people. La Conga Cave is so named because the bones of a female howler monkey (*una conga*) were found inside a niche near the cave entrance, a cave that according to the local geology of Nicaragua shouldn't even exist in this region. Transport to such a remote site in Nicaragua was difficult to say the least. The team initially took a four wheel drive vehicle over the rough terrain from Waslala to El Tope, fording several rivers as they went. Once at El Tope, Ruth Ann, Daniel and Suzanne were met by a team of mules and horses (!) to complete the next leg of the journey.



Ruth Ann and Daniel collecting samples in La Conga Cave

After nearly three hours on mule-back through the mountainous jungle they arrived at El Tigre and the home of the family with whom the team was staying. The next morning, the team began the hour and a half hike to the Cueva La Conga site. In six and a half hours, the research team collected ten samples of paintings before oncoming darkness forced them to begin the long hike back to their base camp. They left El Tigre the next day, and went on to further adventures involving a missing passport, an earthquake in Costa Rica, and a flooded basement in Michigan! The analysis and dating is ongoing, but it is hoped that by the time of the Chemistry Banquet in April they will have the first ever dating results for this magnificent piece of rock art in Nicaragua. Clearly the whole trip to Central America was an exhausting but exciting one, but also it was an experience that Ruth Ann, Daniel and Suzanne will never forget!