

CHEMISTRY DEPARTMENT NEWSLETTER

Spring 2004

EMU CHEMISTRY DEPARTMENT WELCOMES NEW FACULTY

The Chemistry Department welcomed Simon Garrett to our outstanding faculty this fall. This analytical chemist comes to us from Michigan State University. He earned his doctorate degree in the UK at the Imperial College of Science and Technology.

His research focuses on the characterization of solids and surfaces. Two main research directions are pursued in the Garrett group. First, they are interested in the adsorption and reactivity of small molecules on carbon surfaces as models of atmospheric soot particles. The surfaces are modified, chemically and physically, to improve the realism of the model. Second, they synthesize and characterize nanoparticles of metal oxides with interesting properties, including those with novel catalytic, photocatalytic and magnetic properties. Simon uses a variety of surface-sensitive analytical techniques to determine surface composition and morphology including desorption measurements based on mass spectrometry, x-ray photoelectron spectroscopy (XPS), and scanning tunneling microscopy (STM).

PICTURE OF SIMON

CHEMISTRY ACQUIRES NEW INSTRUMENT

Pfizer Corporation has graciously given our department a state of the art mass spectrophotometer for laboratory and research projects. Elizabeth Butch, one of our biochemistry faculty members, was instrumental in this acquisition through her relationship with Pfizer. Students will be able to learn MS instrumentation and be able to participate in research projects and possible internships on biochemical topics.



FACULTY RESEARCH

Two of our faculty earned awards this past year. Deborah Heyl-Clegg received a Faculty Research Fellowship and Donald Snyder earned a Sabbatical Award. They explain a bit of their research in the articles below.

Dr. Heyl-Clegg's Cyclic Peptide Inhibitors of α -Amylase

The project involves the design of small peptide inhibitors for the enzyme α -amylase, which catalyzes the cleavage of glucose units from dietary starch. Inhibition of this enzyme would be beneficial in controlling blood sugar levels between insulin treatments in diabetic patients as well as in weight control. The crystal structure of the complex formed by the enzyme and a natural 74-amino acid protein inhibitor, Tendamistat, indicates that one particular segment, incorporating a turn structure with a positive charge projected outward, is essential for interaction with the enzyme active site. Smaller peptide analogs of this inhibitor, comprising only this key amino acid segment, are being synthesized and then analyzed in a spectrophotometric assay. Some peptides are cyclized by disulfide bond formation between cysteine residues flanking the segment. This method of conformational restriction results in analogs with fewer accessible three-dimensional arrangements than linear peptides, possibly "locking" in a bioactive shape. The inhibitory activity of these compounds can then be compared directly with one another and with analogous linear peptides to determine which features are advantageous for enzyme interaction. In collaboration with Maria Milletti, molecular modeling and molecular orbital energy calculations are being utilized to further interpret the kinetic data. Compounds completed thus far display moderate inhibition, and localization of the positive charge on the central arginine residue is correlated with this activity.

Dr. Snyder's Sabbatical in England

The University of London, campus of Queen Mary, is in the East End of London and while working there I had the good fortune to live in a very comfortable residential area of the Docklands further east of the campus known as Beckton. Between commuting during the week on the Underground and exploring the rest of London on the weekends, I had the great pleasure of getting to know my way around the city quite well and now practically feel like a native. This sabbatical provided the refreshing opportunity to initiate scientific work in an entirely new field and in a research environment significantly different from our routine at EMU. Being able to spend the majority of my days in the laboratory, unfettered by the time restraints of classroom schedules, was a renewing and energizing experience, as were my interactions with the faculty at Queen Mary. The Institute Director, P. Vadgama, and other faculty members, as well as the graduate students in the Biomedical Materials group, made me feel welcome and a genuine part of their institution (I still carry my Queen Mary Faculty ID Card with a sense of pride). Since I was working as part of the biosensors team I even had the opportunity to participate (at QM's expense) in the Fourth European Workshop on Biosensors held on Menorca, one of Spain's Mediterranean islands, from November 2-4. During my stay, progress on the research project was good, although not quite in the direction originally anticipated. In making modifications to the impedance analysis equipment for greater reproducibility, we discovered a novel method of acquiring and graphically presenting impedance data that may have significant applications in many related areas of impedance spectroscopy. A grant application co-authored with Dr. Vadgama was made to the UK-EPSCRC funding agency to support the joint project at Queen Mary. The grant was approved and will supply travel funds and other support to continue the collaborative work between the Chemistry Department at EMU and the IRC at Queen Mary.

STUDENT ACTIVITIES

CHEMISTRY CLUB

Below is a brief report of the Chemistry Club activities under the guidance of assistant professor Harriet Lindsay.

President: Cortney Petrok
Vice-president: Krystle Fordyce
Treasurer: Natalie Abraham
Secretary: Rochelle Ferrett

Last year Mike Pratt and Cortney Petrok represented the Chem Club at the national ACS meeting in New Orleans. This academic year we've done the usual stuff: Saturday at the Lab/Family Day, the Ann Arbor Hands-On Museum, and the chemistry magic show. A group of Willow Run elementary students joined us for the chemistry magic show. The club also went bowling last fall.

UNDERGRADUATE SYMPOSIUM



Christopher Knight proudly displays his Undergraduate Symposium poster to faculty mentor Arthur Howard.

Five undergraduates gave oral presentations and six posters were presented at the Undergraduate Symposium last spring at McKenney Union.

Elizabeth Blaney *A Minimal Sequence Peptide Inhibitor for alpha-Amylase*

Reiko Peterson *Automating the In Vitro Micronucleus Assay*

Christopher Knight *Theoretical Characteristics of the Potential Energy Surfaces of 2-(3-Benzylaminopropanoylamino) benzamide*

Mace Mattieson *The Effects of Various Quenching Agents on Excited 2,2'-Bipyridine Ruthenium (II) Dichloride Hexahydrate*

Michael Hyde *An Acid-Catalyzed Aldol Reaction Under Microwave-Induced, Solvent-Free, Conditions*

RaShawn Rushing *Analysis of Oxidized Arachidonic Acid and Product Stability*

Christopher Knight *Microwave Synthesis and Investigation of Some Nitrogen Heterocycles*

Nan Houser *Characterization of Clays and 17th Century Bricks from Historic St. Mary's City, Maryland*

Adam Gracon *Computational Characteristics of a Series of Eicosanoids*

Linda Michelle Einhorn *Water Quality Parameters in the Stony Creek Watershed*

Kristie Mitchell, Ronique Keane-Dawes and Gregory Fondren

Myoglobin-Stimulated Destruction of Arachidonyl-Containing Phospholipids

GRADUATE RESEARCH FAIR

Here is a list of our graduate students that presented at the annual Graduate Research Fair held on the EMU campus:

Shakila Tobwala: Development of Peptide Inhibitors of Alpha-Amylase as Potential Pharmaceuticals for Diabetes

Sujith Chacko: Application of Ru³⁺-Based Catalysts for Metathesis of Norbornyl-Derivatized Soybean Oil – A Novel Non-Oxygen Curing Mechanism

Leena Khullar: Cyclic Peptide Inhibitors of Alpha-Amylase Based on Tendamistat

Babho Devadoss: In Vitro Myoglobin-Induced Lipid Peroxidation

STUDENT AWARDS

R.W. Peet Award	Elizabeth Blaney
ACS Huron Valley Section Undergraduate Award	Chris Knight
American Institute of Chemists Award	Mace Mattieson
Collins Endowed Scholarship	Paula Gutman
Decoster Endowed Scholarship	Christopher Clifford and Christina Varzoaba
Hypercube Scholar Award	Jason Boyle
Huron Valley Service Award	Tracey Kovach and Michael Pratt
Lobbestael Scholarship	Laura Kelly
CRC Press Freshman Award	Donald Bell
Brundage Scholarship	Adam Foster
Biochemistry Achievement Award	Matthew Bidlack
Wiley Inorganic Chemistry Award	Bryan Curfman
Toxicology Achievement Award	Kristin Randall
Pfizer Toxicology Scholarship	Euline LeTang and Reiko Peterson
ACS Organic Chemistry Award	Bryan Curfman
ACS Division of Analytical Chemistry Award	Nan Richards
John J. Contario Analytical Chemistry Award	Nan Richards
ACS Huron Valley Section EMU Outstanding Graduate Student	Shakila Tobwala
Graduate Teaching Award	Fumi Ebisu
Graduate Research Award	Sujith Chacko
Ronald M. Scott Memorial Scholarship	Babho Devadoss
John M. Sullivan Research Initiation Scholarship	Cortney Petrok

TEACHING AWARDS

Our excellence in teaching was recognized by the university through two members receiving awards.

Lecturer Sharon MacKellar actually received two awards: Holman Learning Center's Beyond the Call of Duty for teaching and a Lecturer's Union Teacher of the Year Award. Sharon, an EMU alum, has been with the department for eight years. She enjoys teaching the chemistry and has developed labs and projects for her students in the elementary science education class offered in our department.

Associate Professor Vance Kennedy also received the Holman Learning Center's Beyond the Call of Duty award for teaching. Vance is the coordinator for the General Chemistry Laboratory and gets students excited about chemistry through his various class demonstrations such as liquid nitrogen, cannonball, and the infamous electric pickle.



Sharon MacKellar presents a pre-lab lecture.



Vance Kennedy.

FACULTY ACTIVITIES IN THE DEPARTMENT

Mike Brabec:

“The Response of Adult Rat Sertoli Cells, Immortalized by a Temperature-Sensitive Mutant of SV40, to 1,2-dinitrobenzene, 1,3-dinitrobenzene, 2,4-dinitrotoluene, 3,4-dinitrotoluene and Cadmium” Sorenson, D. and Brabec, M.J. (2003) *Cell Biology and Toxicology*, 19:107-119.

Professor Brabec is serving on the NTP-Center for the Evaluation of Risks to Human Reproduction Expert Panel to review the report *Reproductive and Developmental Toxicity of Acrylamide*, that will be entered into the Federal Register March 15, 2004.

Timothy Friebe:

“Rapid Synthesis of Substituted 5-Phenyl-1,3-dioxolan-4-ones Under Microwave-induced Solvent-free Conditions” Friebe, Timothy L.; Ferrett, Rochelle R.; Hyde, Michael J.; Lahti, Kimberly A. *Tetrahedron Letters*, **2003**, *44*, 2573-2576.

“Microwave-induced Synthesis of a *Cis/Trans* Mixture of 2-Butyl-5-phenyl-1,3-dioxolan-4-ones and Their Stereochemical Determination Using NOESY 2-D NMR Spectroscopy” Friebe, Timothy L. *The Chemical Educator*, **2003**, *8*, 1-4.

Krish Rengan:

“Measurement of absolute gamma emission probabilities” *Nucl. Instr. Methods A505*, 343 (2003).

Edited proceedings of the 10th symposium on radiation measurements and applications along with Henry Griffin, Les Rogers and David Wehe [UM]; published as *Nucl. Instr. Methods A505* (2003).

Ruth Ann Armitage:

“Compositional Analysis of 17th-Century Brickmaking Technology in the Chesapeake Region” R. A. Armitage, L. Minc, D. V. Hill, and S. D. Hurry, ANACHEM 2003, Detroit ACS Section (November 2003)

“Post-excavational Changes in Soil Chemistry: An Archaeological Curation Problem” R. A. Armitage and S. D. Hurry, PITTCO 2003 (March 2003)

FACULTY PRESENTING IN CALIFORNIA

Four faculty members, Maria Milletti, Harriet Lindsay, Bert Ramsay and Tim Brewer, along with several students, will be trekking across the country to Anaheim to present their work at the National ACS Conference. Milletti has been very busy with research and is presenting four projects at the conference. Ramsay will be attending the national ACS meeting in Anaheim for two purposes: He will represent the Huron Valley ACS local section as one of the two Councilors and will present a talk entitled “The Chinese Periodic Table: A Rossetta Stone for Understanding the language of chemistry in the Context of the Introduction of Modern Chemistry into China”

DEPARTMENTAL SERVICE

21st Century Community Learning Center Grant at Willow Run Schools

Professors Tim Brewer and Larry Kolopajlo along with Sharon MacKellar have been participating in a Department of Education Grant to develop academic enrichment activities for grades K-5 at Kaiser Elementary School and grades 6-8 at Edmondson Middle School during the school year.

During the summer, Sharon and Tim ran three 2-week summer camps for twenty middle school children on the water quality study of the Raisin River, airplanes and flight, and renewable energy sources such as wind and solar power.

Saturday Morning at the Lab

Each year, in the spirit of National Chemistry Week and during Family Day here at EMU, the Department of Chemistry hosts 'Saturday at the Lab'. This is a chance for area youth to come together with our university community to enjoy the excitement and intrigue of science. This year we—EMU's Chemistry Club and area high school student volunteers—joined forces with volunteers from EMU's Department of Geography and Geology and Pfizer, Inc. in Ann Arbor. With these joined forces, and an excellent turnout of grade school students from all around the area, our program was a great success. Another record crowd this year—over 1400 visitors to our event!



Chemistry professor Heather Holmes demonstrates some of the peculiar properties of oobleck at Saturday Morning at the Lab.

Huron Valley High School Chemistry Teacher's Association
The American Chemical Society is sponsoring a high school Chemistry teachers' group which holds monthly meetings in the Chemistry Department of EMU. Professor Bert Ramsey was instrumental in starting the group, and Larry Kolopajlo is serving as coordinator. The group is working on projects which can be used to stimulate high

school chemistry teaching. For example, Dennis Atkins of Jackson Northwest High School is giving a talk on Forensic Chemistry with Larry Kolopajlo at the March MSTA meeting in Lansing. Larry has also visited several high schools to perform water pollution experiments with them. The group plans to hold a spring meeting in which various teachers will present papers.