

*James Madison University
Undergraduate Research Symposium
Summer 2007
July 26, 2007 - August 3, 2007*



Colleges and Universities From Which REU Students Have Come to JMU Since 2001

- Allegheny College
- Bethany College
- Bethel College
- Blue Ridge CC
- Bridgewater College
- Boston College
- College of William and Mary
- Clemson University
- Davidson College
- Drake University
- Eastern Mennonite University
- East Tennessee State University
- Edgewood College
- Elizabeth City State University
- Elon University
- Fairfield University
- Framingham State University
- Gallaudet University
- Grove City College
- Hampden-Sydney College
- Harvey Mudd College
- High Point University
- Hood College
- James Madison University
- Longwood College
- Lynchburg College
- Mary Baldwin College
- Merrimack College
- Mississippi State University
- Mount Holyoke College
- Mount Union College
- Northern Virginia CC
- Paul Quinn College
- Piedmont Virginia CC
- Pomona College
- Pontifical Catholic University of Puerto Rico
- Princeton University
- Providence College
- Queen's University, Belfast
- Radford University
- Randolph-Macon College
- Randolph-Macon Woman's College
- Rochester Institute of Technology
- Rutgers University
- Saint Joseph's College
- Southern Illinois University
- Sweet Briar College
- SUNY-New Paltz
- Technical University of Denmark
- University College, Galway
- University of Alabama
- University of Belgrade
- University of Dayton
- University of Mary Washington
- University of Maryland, College Park
- University of Missouri—Rolla
- University of North Carolina—Wilmington
- University of Rochester
- University of Virginia
- Virginia Union University
- Washington & Lee University
- Western Carolina University
- Willamette University
- Winston-Salem State University
- Xavier University

Breakfast and Wrap-Up Meeting

Thursday, July 26

8:30 AM - 9:30 AM

Burruss Hall 238

Required for all Biology NSF REU students

Biology - Poster Session I

Thursday, July 26

9:45 - 10:45

Burruss Hall, First Floor

- 1-A. **Further sequencing of Ba7, a phage of *Bordetella avium*.**
Brooke Brehm, Nathan Beach, *Louise Temple
Dept. of Biology, James Madison University
- 1-B. **The Expression of the CB₂ Cannabinoid Receptor Treated with LPS and JWH.133.**
LaQuasha Javon Drisdale¹ and *Robyn Puffenbarger²
¹Dept. of Biology, Paul Quinn College
²Dept. of Biology, Bridgewater College
- 1-C. **Optimization of Polyhydroxybutyrate Depolymerase Synthesis in *Streptomyces sp. 5A*.**
Tessa Griffin and *Stephen Baron
Dept. of Biology, Bridgewater College
- 1-D. **Three RhoA Mutations Behave as Loss-of-Function Alleles During *Drosophila* Embryonic Morphogenesis.**
Fafa Huberta Koudoro¹ and *Susan Halsell²
¹Dept. of Biology, Mount Holyoke College
²Dept. of Biology, James Madison University
- 1-E. **A characterization of skin microbiota in four populations of mountain yellow-legged frogs, *Rana muscosa*: does it protect frogs from a lethal pathogen?**
Brianna Lam and *Reid Harris
Dept. of Biology, James Madison University
- 1-F. **Functional Analysis of *Myf-5* and α -*actin* in the four-toed salamander, *Hemidactylium scutatum*.**
Amanda Lee and *Carol Hurney
Dept. of Biology, James Madison University
- 1-G. **Lengthening the TGnTATGm Polymorphism in the Nitric Oxide Synthase 1f Promoter changes human NOS1 transcription.**
David Mitchell and *Terrie Rife
Dept. of Biology, James Madison University
- 1-H. **Redox sensitivity of the NR3A subunit containing NMDA glutamate receptor.**
Margaret Rose Parker and *Greta Ann Herin
Dept. of Biology, Eastern Mennonite University

Biology—Keynote Address

Thursday, July 26

11:00 - 12:00

Burruss Hall 238

Moonlights in Plant Biology: What are Cytoplasmic Enzymes Doing in the Nucleus???

Dr. Brenda Winkel

Professor, Dept. of Biological Sciences

Virginia Polytechnic Institute and State University

(Host: Dr. Jon Monroe)

Biology

Biology—Lunch

Thursday, July 26

12:15 - 1:15

Circle in front of Burruss Hall

Biology—Poster Session II

Thursday, July 26

9:45 - 10:45

Burruss Hall, First Floor

- 2-A. **Effect of *Bordetella avium* on Nitric Oxide Synthase Production in Ciliated Tracheal Epithelial Cells of Turkeys.**
Eva Karam¹, Nathan Beach², and *Louise Temple²
¹Dept. of Biology, Elon University
²Dept. of Biology, James Madison University
- 2-B. **Characterization of the Thermoneutral Zone of the Laboratory Rat.**
Nhut-Minh P. Le and *Justin Brown
Dept. of Biology, James Madison University
- 2-C. **An experimental test of environmental transmission of antifungal skin bacteria in the red-backed salamander, *Plethodon cinereus*.**
Tracie Nelms and *Reid Harris
Dept. of Biology, James Madison University.
- 2-D. **Redox Modulation of Amino Terminal Domain Deleted NR1 Recombinant NMDA Receptor Co-expressed with NR2B.**
Obi E. Onuoha¹ and *Greta Ann Herin²
¹Dept. of Biology, Virginia Union University
²Department of Biology, Eastern Mennonite University
- 2-E. **Embryonic expression of *Myf-5* Gene in the Four-Toed salamander, *Hemidactylium scutatum*.**
Dana Prater¹ and *Carol A. Hurney²
¹Dept. of Biology, Lynchburg College
²Dept. of Biology, James Madison University.
- 2-F. **Antigenic Relatedness and Serological Cross Reactivity of Various *Bordetella avium* strains.**
Tiffany Pryce, Nathan Beach, and *Louise Temple
Dept. of Biology, James Madison University
- 2-G. **Modulation of the CB₂ cannabinoid receptor in mouse RAW 264.7 macrophages stimulated with IFN- γ and treated with JWH-133.**
Sarah Marie Thomas¹ and *Robyn Puffenbarger²
¹Dept. of Biology, James Madison University
²Dept. of Biology, Bridgewater College.
- 2-H. **Isolation and characterization of novel 5' splice variants of neuronal nitric-oxide synthase mRNA from rat PC12 cells.**
Amanda Wisz¹ and *Terrie Rife²
¹Dept. of Biology, Sweet Briar College
²Dept. of Biology, James Madison University.

Biology - Ice Cream Cake Finale

Thursday, July 26

2:30 - 3:00

In front of Burruss Hall

Chem/Mats - Session I - Oral Presentations
Thursday, August 2
8:30 - 10:30
Festival Conference Center, Highlands Room
Dr. Brian Augustine, Presiding

- 8:30 **A Cyclopropanol Fragmentation Approach To The Synthesis Of Cis- And Trans- Oxepanes.**
Kevin Jellerson¹, David Showalter², and *Kevin P. C. Minbiole¹
¹Dept of Chemistry and Biochemistry, James Madison University
²Dept. of Chemistry, Eastern Mennonite University
- 8:45 **Synthesis of Horizontally and Vertically Oriented Carbon Nanotubes.**
Thomas Dowd and *Scott Paulson
Dept. of Physics and Astronomy, James Madison University
- 9:00 **Electrical Properties of Double-Walled Carbon Nanotubes.**
Jack Larsen¹ and *Scott Paulson²
¹Department of Micro and Nanotechnology, Technical University of Denmark
²Dept. of Chemistry and Biochemistry, James Madison University
- 9:15 **Ruthenium and Cerium Complexes of Bis(diphenylphosphino)ethane Monoxide.**
Morgan L. Moyer, *Thomas N. Gallaher, *John W. Gilje, *Donna S. Amenta
Dept. of Chemistry and Biochemistry, James Madison University
- 9:30 **A Telescope for Detecting Cosmic Ray Muons.**
Matt Venne, *Ioana Niculescu, and *Gabriel Niculescu
Dept. of Physics and Astronomy, James Madison University
- 9:45 **Robust Numerical Algorithm to Solve Ordinary Differential Equations.**
Sarah Sellman and *Anthony Tongen
Dept. of Mathematics and Statistics, James Madison University
- 10:00 **Characterization of Hydrated Ru/Al₂O₃.**
Tom Kenderdine, Diana Gottschalk, and *Kathryn A. Layman
Dept. of Chemistry and Biochemistry, James Madison University
- 10:15 **Circular Dichroism Studies of Salt Effects on the Unfolding of RecA.**
Princess Bempong¹, Emanuel Lubart¹, and *Gina MacDonald²
¹Dept. of Chemistry, Gallaudet University
²Dept. of Chemistry and Biochemistry, James Madison University

Chem/Mats - Keynote Address
Thursday, August 2
11:00 - 12:00
Festival Conference Center, Highlands Room

Phosphopeptides as Targets for Cancer Immunotherapy
Dr. Joy Polefrone ('02)
Dept. of Chemistry
University of Virginia
(Host: Dr. Brian Augustine)

Chem/Mats - Session II - Oral Presentations
Thursday, August 2
1:30 - 3:30
Festival Conference Center, Highlands Room
Dr. Scott Paulson, Presiding

- 1:30 **In-Situ Photopolymerized Micromolding as a Technique for the Fabrication of Poly(Methyl Methacrylate) Microfluidic Devices.**
Patrick Turner¹, *Brian Augustine¹, and *Chris Hughes²
¹Dept. of Chemistry and Biochemistry, James Madison University
²Dept. of Physics and Astronomy, James Madison University
- 1:45 **Cloning and Expression of a Novel Enzyme, n-Acylethanolamine-Hydrolyzing Acid Amidase.**
Lindsey P. Pattison and *Victoria L. Mariani
 Dept. of Chemistry and Biochemistry, James Madison University
- 2:00 **Refined Methodology in Testing for THMS and the Presence of THMS in the Shenandoah Valley.**
Jordan M. Burgener¹ and Tammy L. Stone¹, and *Daniel M. Downey
¹Spotswood High School, Penn Laird, VA
²Dept. of Chemistry and Biochemistry, James Madison University
- 2:15 **Software Development for the JMU MINERvA Photomultiplier Tube Alignment Stand.**
Erik van der Goetz, *Gabriel Niculescu, and *Ioana Niculescu
 Dept. of Physics and Astronomy, James Madison University
- 2:30 **Identification and the Thermal Decomposition of the Surface Species Formed From the Reaction Between Nitric Acid and Boehmite/Alumina.**
Matthew W. Ross and *Tom C. Devore
 Dept. of Chemistry and Biochemistry, James Madison University
- 2:45 **Synthesis and Colloidal Study of Cationic Gemini Surfactants – A Series of Experiments to Introduce Nanoscience into Introductory, Organic, Physical and Upper-Level Chemistry Laboratories.**
Stephanie L. Torcivia and *Kevin L. Caran
 Dept. of Chemistry and Biochemistry, James Madison University
- 3:00 **Nanoscience in a Suitcase.**
Jon Wyrick¹, *Scott Paulson¹, *Brian H. Augustine², Aron Helser³, Dominik Brändlin⁴
¹Dept. of Physics and Astronomy, James Madison University
²Dept. of Chemistry and Biochemistry, James Madison University
³3rdTech Incorporated, Chapel Hill, NC
⁴NanoSurf AG, Liestal, Switzerland

Chem/Mats - Poster Session
Thursday, August 2
3:30 - 4:30

Festival Conference Center, First Floor Drum

Posters will be on display from 3:30-4:30 PM with students present to answer questions. We'd like to ask that they remain on display through the Friday morning coffee break as well.

- 3-A **Fabrication of a Benchtop Instrument for Thermal Linescan Technique and Development of a Tutorial for Surface Optical Property Measurement.**
Dane Arpino and *Jonathan Miles
 Dept. of Integrated Science and Technology, James Madison University
- 3-B **Analysis of Estrogens as Related to Intersex Fish.**
James B. Ayers and *Daniel M. Downey
 Dept. of Chemistry and Biochemistry, James Madison University
- 3-C **Pollution Control Measures of Trout a Stream in the George Washington National Forest.**
Michelle L. Bender and *Daniel M. Downey
 Dept. of Chemistry and Biochemistry, James Madison University
- 3-D **Interactions Between Boric Acid and Ammonia.**
David Berry and *Tom DeVore
 Dept. of Chemistry and Biochemistry, James Madison University

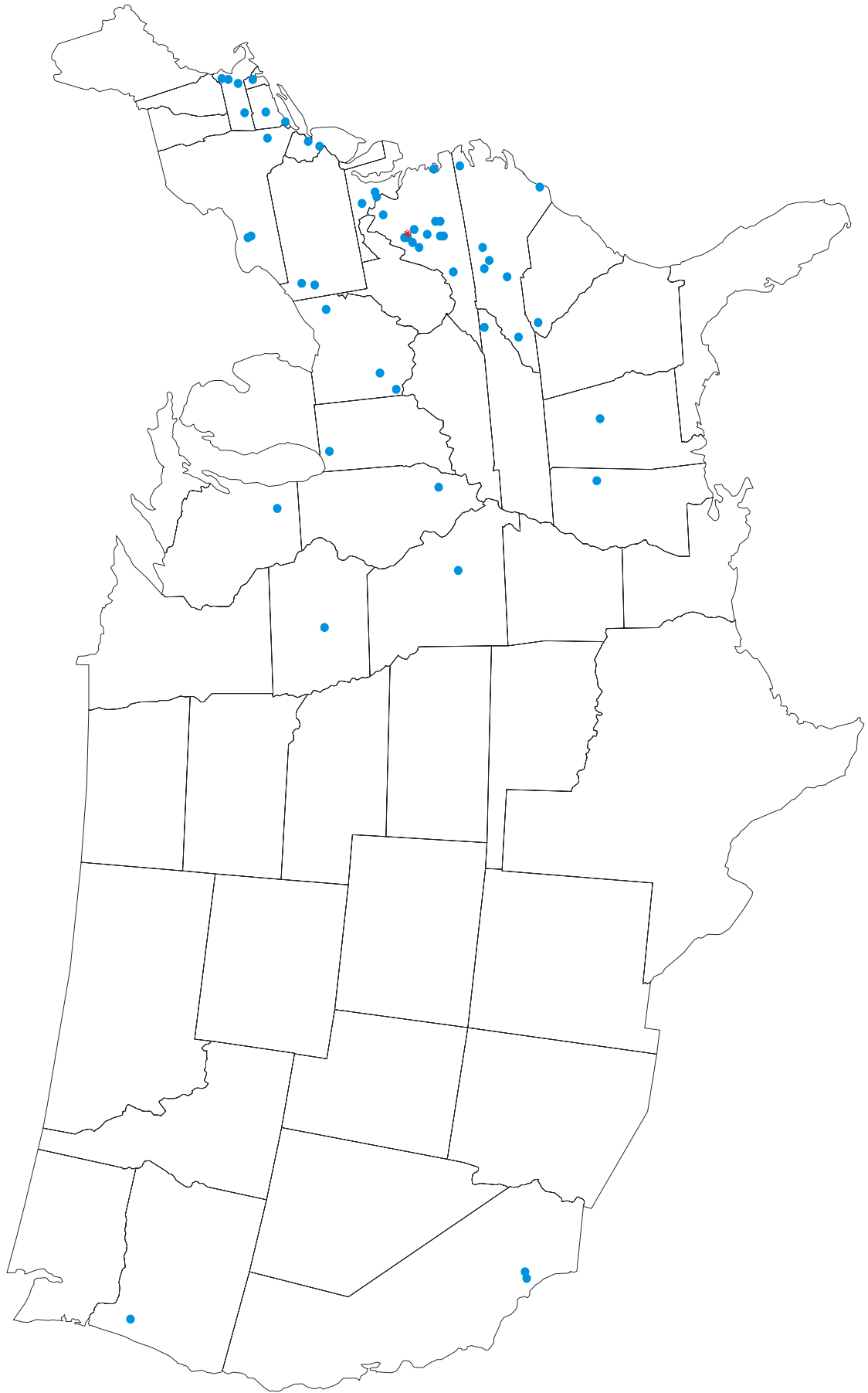
- 3-E **The Use Of 3-Aminopropyltriethoxysilane And 11-Bromoundecyltrichlorosilane Self-Assembled Monolayers On Glass Surfaces For Low Temperature Bonding of Glass Microfluidic Devices.**
Matthew J. Bradley and *Brian H. Augustine
 Dept. of Chemistry and Biochemistry, James Madison University
- 3-F **THM Determination with Modified GC-ECD Methods.**
 Jordan M. Burgener¹ and Tammy L. Stone¹, and *Daniel M. Downey
¹Spotswood High School, Penn Laird, VA
²Dept. of Chemistry and Biochemistry, James Madison University
- 3-G **Using Difference Infrared Spectroscopy to Study the Effects of Salt and pH on Nucleotide Binding to Phosphoglycerate Kinase**
Jaime Campbell, Adam Colbert and *Gina MacDonald
 Dept. of Chemistry and Biochemistry, James Madison University
- 3-H **Environmental Conditions and the Shenandoah River Fish Kills: Part II (2007 Update)**
Stuart Cannaday¹, *Dan Downey², *Thomas Benzing¹
¹Dept. of Integrated Science and Technology, James Madison University
²Dept. of Chemistry and Biochemistry, James Madison University
- 3-I **p-Cresol Oxidation Catalysts.**
Cynthia W. Din, Sarah A. McDaniel, and *Kathryn A. Layman
 Dept. of Chemistry and Biochemistry, James Madison University
- 3-J **Luminescent Transition Metal Complexes For Use as Molecular Reporters of pH.**
Eileen N. Dixon¹, Michael Z. Snow², *Benjamin A. DeGraff²
¹Dept. of Chemistry and Biochemistry, Southern Illinois University
²Dept. of Chemistry and Biochemistry, James Madison University
- 3-K **Investigating the Stability of Phosphoglycerate Kinase in Various Salt Concentrations.**
William Gardner¹ and *Gina MacDonald²
¹Dept. of Chemistry, Gallaudet University
²Dept. of Chemistry and Biochemistry, James Madison University
- 3-L **Role of Reagent on Morphology and Crystal Formation in Ionothermal Synthesis of Aluminophosphates.**
Jeremy Harris and *Barbara A. Reisner
 Dept. of Chemistry and Biochemistry, James Madison University
- 3-M **Synthesis and Study of Amphiphilic Catenanes.**
Nicholas Henrich and *Kevin L. Caran
 Dept. of Chemistry and Biochemistry, James Madison University
- 3-N **Strength of Wet Granular Materials: From Sand to Quicksand.**
Ralph Herman and *Brian Utter
 Dept. of Physics and Astronomy, James Madison University
- 3-O **BisCationic Amphiphiles.**
Addie R. Hill¹ and *Kevin L. Caran²
¹Dept. of Chemistry, Winston Salem State University
²Dept. of Chemistry and Biochemistry, James Madison University
- 3-P **Soft Lithographic Patterning of Biodegradable Polymers for *in situ* AFM Characterization.**
Keegan Hines¹ and *Brian H. Augustine²
¹Dept. of Physics, Washington & Lee University
²Dept. of Chemistry and Biochemistry, James Madison University
- 3-Q **Fluorescence Labelling Of Serotonin In Blood Samples For Quantitation By Means Of High Performance Liquid Chromatography (HPLC) Using Fluorescence Detection.**
Elizabeth A. Hochreiter and *Gina MacDonald
 Dept. of Chemistry and Biochemistry, James Madison University
- 3-R **Enantioseparation of Profen Drugs by Capillary Electrophoresis: Using Vancomycin and Cyclodextrin as Chiral Selectors.**
Rebecca A. Hunter and *Kevin H. Bennett
 Dept. of Chemistry, Hood College
- 3-S **Experimental Study of a Double Pendulum: Design and Fabrication.**
Dan Kelly and *William H. Ingham
 Dept. of Physics and Astronomy, James Madison University
- 3-T **Measurement of Spectral Absorbance of Infrared Radiation on Silicon-Based Solar Cells and its Effects on Temperature and Performance.**
Erik Minges¹ and *Jonathan Miles²
¹Department of Physics and Dept. of Mathematics, UNC-Wilmington, ²Dept. of Integrated Science and Technology, James Madison University

- 3-U **Micromolding by Photopolymerization in Capillaries (μ -PIC).**
Gustavo Ramallo¹, *Chris Hughes², and *Brian H. Augustine³, James Madison University.
¹Dept. of Physics, University of Mary Washington
²Dept. of Physics and Astronomy, James Madison University
³Dept. of Chemistry and Biochemistry, James Madison University
- 3-V **Investigation of possible antifungal compounds found in bacteria isolated from the Four-Toed Salamander, *Hemidactylium scutatum* and the Redback Salamander, *Plethodon cinereus*.**
Christian Schwantes, Robert Brucker, *Kevin Minbiole, and *Reid Harris.
 Dept. of Chemistry and Biochemistry and Dept. of Biology, James Madison University.
- 3-W **Analysis of Fish Otoliths and Tissue from the Shenandoah River System for Trace Elements using ICP-MS.**
Wesley Storm and *Daniel M. Downey
 Dept. of Chemistry and Biochemistry, James Madison University

Chem/Mats - Session III - Oral Presentations
Friday, August 3
8:30 - 12:00
Festival Conference Center, Highlands Room
Dr. Kevin Minbiole, Presiding

- 8:30 **Cyclopropane Fragmentation Approaches to the Synthesis of Piperidines and Azepines.**
Marita C. Lawler, Alison M. Whitehurst, and *Kevin P. C. Minbiole
 Dept. of Chemistry and Biochemistry, James Madison University
- 8:45 **Avalanching in Granular Systems with Imposed Vibrations.**
Dan Amon and *Brian Utter
 Dept. of Physics and Astronomy, James Madison University
- 9:00 **Modeling AFM Deformation of Cylindrical Tubes.**
Callie Johnson and *Anthony Tongen
 Dept. of Mathematics and Statistics, James Madison University
- 9:15 **An Investigation of the Binding Interactions Between Single and Double Strand DNA to Colloidal Gold Nanoparticles.**
John DeJarnette and *Barbara A. Reisner
 Dept. of Chemistry and Biochemistry, James Madison University
- 9:30 **The Synthesis of Bicyclo[4.2.0]-7-ene and Other Substituted Cyclobutenes for Reactions With Difluorocarbene.**
Jennifer L. Bon and *Scott B. Lewis
 Dept. of Chemistry and Biochemistry, James Madison University
- 10:00 **Coffee Break**
- 10:30 **Structural and Thermal Stability Studies of Supramolecular Propargylic Alcohol Organogels.**
Clayton M. Dingle and *Kevin L. Caran
 Dept of Chemistry and Biochemistry, James Madison University
- 10:45 **Microscopy and Phase Transition Analysis of POSS-MA.**
Ashley J. Figueiredo¹, *Chris Hughes², and *Brian Augustine³
¹Dept. of Chemistry, Sweet Briar College
²Dept. of Chemistry and Biochemistry, James Madison University
³Dept. of Physics and Astronomy, James Madison University
- 11:00 **Synthesis of 2,2'-bipyridine-4,4'-bis(phosphonic)acids.**
Dien Tu¹, Kristina Michelle Hardy², *Debra L. Mohler¹,
¹Dept. of Chemistry and Biochemistry, James Madison University
²Dept. of Chemistry, High Point University
- 11:15 **Educational Interpreting in a Chemistry Setting: Fingerspelling Novel Words.**
Laurie L. Williams and Steven T. Kulsar
 Dept. of Communications Sciences and Disorders, James Madison University
- 11:00 **Chemical Shift and Relaxation Times in Hydrogen Bonding Compounds.**
Ana Stevanovic¹ and *Tom DeVore²
¹Dept of Chemistry, University of Belgrade
²Dept of Chemistry and Biochemistry, James Madison University
- 11:15 **Using Difference Infrared Spectroscopy To Investigate Nucleotide Exchange In Phosphoglycerate Kinase.**
Adam Colbert, Jaime Campbell, and *Gina MacDonald
 Dept of Chemistry and Biochemistry, James Madison University

**Chem/Mats - Pizza Luncheon
Friday, August 3
12:00-2:00
Dave's Taverna, Downtown Harrisonburg
Dr. Dan Downey, Presiding**



Just as a dancer or musician can't learn their art simply by watching, students in the sciences must actively participate in a scientific pursuit to truly understand their craft. Undergraduate research has long been a critical part of the education of undergraduate scientists at James Madison University. The faculty, who care deeply about both being active scholars and excellent teachers, combine with students who desire to go beyond the typical classroom experience to create a unique atmosphere in which student and professor can both feel a sense of pride and ownership in high level scientific research. The primarily undergraduate focus of JMU means that undergraduates have the opportunity to learn how to be scientists in a nurturing but challenging atmosphere.

The summer of 2007 marks the 15th in which the Chemistry Department at JMU has hosted a Research Experiences for Undergraduates (REU) program funded by the National Science Foundation (NSF). The REU program is designed to give students from both JMU and other institutions the opportunity to do summer research. Since 2000, the Chemistry program has been joined by one in materials research which has included faculty and students from not only Chemistry but also Physics, Geology, ISAT, and Mathematics. This program was initially funded by the NSF program through the Division of Materials Research, but now receives funds from the Department of Defense (DoD) ASSURE (Awards to Stimulate & Support Undergraduate Research Education) program. In 2002, REU programs were started in Biology and Mathematics. The Biology program includes not only James Madison but also the biology departments at Eastern Mennonite University and Bridgewater College. These students are added to the many who work on other grants received by the faculty of James Madison University so that there are well over 100 undergraduate students each summer participating in scientific research which leads to publications, presentations, patent applications, collaborations with other institutions, and service to our community. JMU is one of only 2 primarily undergraduate institutions in the United States to have four funded REU programs at one time.

This symposium will feature the work of students who participated in the REU programs during the summer of 2007. This not only includes students who were supported directly by the grants from the NSF and the DoD which fund the REU and ASSURE programs, but also the many others funded through other research grants and internal JMU funds. This includes other students from the Biology, ISAT, and Physics Departments. All of these students worked together this summer and deserve to be commended for their accomplishments.

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National Science Foundation
Research Corporation
USDA Forest Service
Virginia Department of Environmental Quality
Virginia Department of Game and Inland Fisheries

