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Undergraduate Research Achievements

Undergraduate Research in the School of Natural Sciences

UC Merced is the first American student-centered research university of the twenty-first century. The School of Natural Sciences is committeed to this mission. In fact, many of our undergraduates are engaged in interdisciplinary research with Natural Sciences faculty. Below, we show the accomplishments of our undergraduate research students through publications, conference presentations and posters.

Publications in Peer-Reviewed Journals

The publications below are listed in alphabetical order by the first author.

2009

1. M. Barlow, J. Fatollahi and M. Salverda, "Evidence for Recombination Among the Alleles Encoding TEM and SHV b-lactamases," *Journal of Antimicrobial Chemotherapy* **63**, 256-259 (2009).
2. J. Clark, P. Gonzalez-Rodriguez and A. D. Kim, "Using polarization to find a source in a turbid medium," *Journal of the Optical Society of America A* **26**, 1129-1138 (2009).
3. M. Long, M. A. Sprague, A. A. Grimes, B. D. Rich and M. Khine, "A simple three-dimensional vortex micromixer," *Applied Physics Letters* **94**, 133501 (2009).
4. R. M. Ortiz, A. Mamalis and L. G. Navar, "Aldosterone receptor antagonism reduces urinary C-reactive protein excretion in angiotensin II-infused, hypertensive rats," *Journal of the American Society of Hypertension* **3**, 184-191 (2009).
5. J. Saavedra, S. E. Stafford, M. P. Meyer, "Experimental Transition State for the Corey-Bakshi-Shibata Reduction," *Tetrahedron Letters* **50**, 1324-1327 (2009).
6. S. E. Stafford, M. P. Meyer, "Experimental Transition State for the B-chlorodiisopinocampheyl-borane (DIP-Cl) Reduction," *Tetrahedron Letters* **50**, 3027-3030 (2009).
7. S. Sunagawa, E. C. Wilson, M. Thaler, P. Pringle, V. Weis, M. Medina, and J. Schwarz, "Generation and analysis of transcriptomic resources for a model system on the rise: the sea anemone *Aiptasia pallida* and its dinoflagellate endosymbiont" *BMC Genomics* **10**:258 (2009).
8. H. Zhang, A. Shih, A. Rinna, H. J. Forman, "Resveratrol and 4-hydroxynonenal act in concert to increase glutamate cysteine ligase expression and glutathione in human bronchial epithelial cells," *Archives of Biochemistry and Biophysics* **481**, 110-115 (2009).

2008

1. M. H. C. Baquirin and M. Barlow, "Evolution and recombination of the plasmidic qnr alleles," *Journal of Molecular Evolution* **67**, 103-110 (2008).
2. C. J. Cain, D. A. Conte, M. E. García-Ojeda, L. Gómez Daglio, L. Johnson, E. H. Lau, J. O. Manilay, J. Baker Phillips, N. S. Rogers, S. E. Stolberg, H. F. Swift and M. N. Dawson, "What systems biology is (not, yet)," *Science* **320**, 1013-1014 (2008).
3. J. E. Sharping, J. R. Sanborn, M. A. Foster, D. Broaddus, and A. L. Gaeta, "Generation of sub-100-fs pulses from a microstructure-fiber-based optical parametric oscillator," *Optics Express* **16**, 18050-18056 (2008)
4. J. D. West, S. E. Stafford, M. P. Meyer, "A Mechanistic Probe for Asymmetric Reactions: Deuterium Isotope Effects at Enantiotopic Groups," *Journal of the American Chemical Society* **130**, 7816-7817 (2008).
5. H. Zhang, N. Court, H. J. Forman, "Submicromolar concentrations of 4-hydroxynonenal induce glutamate cysteine ligase expression in HBE1 cells," *Redox Report* **12**: 1/2, 101-106 (2007).

2007

1. A. D. Kim and P. Tranquilli, "Numerical solution of a boundary value problem for the Fokker-Planck equation with variable coefficients," *Journal of Quantitative Spectroscopy and Radiative Transfer* **109**, 727-740 (2007).
2. E. Shorr and A. M. Kelley, "Automatic parameter optimization in modeling absorption spectra and resonance Raman excitation profiles," *Physical Chemistry Chemical Physics* **9**, 4785-4792 (2007).

Conference Talks and Poster Presentations

2009

1. C. Cain, H. Thompson, S. Arcayena, B. McLelland, J. Castillo and J. O. Manilay, "Improving the production of esc-derived hematopoietic stem cells using a `niche in a dish'," *International Society For Stem Cell Research Annual Meeting*, Barcelona, Spain, July 2009
2. J. Ciriza, D. Hall, A. Lu, J.R. De Sena, M. Al-Kuhlani, H. Peiris, T. Carroll, M. E. García-Ojeda, "Adhesion molecules and cytokines expression analysis of murine Hematopoietic Stem Cells in different niches," *7th Annual Meeting, International Society for Stem Cell Research*, Barcelona, Spain July 2009
3. M. P. Meyer; H. Zhu, S. E. Stafford, "Organocatalytic Mechanism: A Cross-Fertilization of Ideas Between Biological and Organic Chemistry," *Enzyme Mechanisms Conference*, Tucson, Arizona, January 2009.

2008

1. A. Camelo, S. Chin, G. Berzenye, M. Suh, R. M. Ortiz, "Middle school children fail to meet dietary fiber recommendations," *Society for the Advancement of Chicanos and Native Americans in Science National Conference*, Salt Lake City, UT, October 9 - 12, 2008.
2. J. Ciriza, D. Hall, S. Wang, T. Carroll and M. E. García-Ojeda, "Study of the role of the HSC niche in HSC migration from the fetal liver to fetal bone marrow," *Experimental Biology 2008* San Diego, CA, April, 2008.
3. J. Ciriza, D. Hall, A. Lu, M. Al-Kuhlani M, H. Peiris, T. Carroll and M. E. García-Ojeda ME, "Adhesion Molecule Expression Analysis of Hematopoietic Stem Cells in Different Niches," *7th Annual Gene Therapy Symposium*, Sonoma, CA, November, 2008.
4. I. Lona, K. Mashburn, J. Phillips, S. Atkinson, R. M. Ortiz, "The effects of acute TSH infusion on glucose metabolism in stellar sea lions," *Science and Engineering Research Symposium*, Sacramento, CA, September 19 - 20, 2008 and *Society for the Advancement of Chicanos and Native Americans in Science National Conference*, Salt Lake City, UT, October 9 - 12, 2008.
5. B. McLelland, J. Castillo, S. Montoy and J. O. Manilay, " Coordinated Expression of Notch Pathway Genes In Thymic Epithelial Cell Subsets," *International Conference on Lymphopoiesis, T Cell Differentiation, and Immune Reconstitution*, San Juan, Puerto Rico, November 2008
6. B. McLelland, J. Castillo, S. Montoy and J. O. Manilay, "Analysis of Notch Signaling Pathway Genes In Purified Mouse Thymic Epithelial Cell Subsets," *California Institute for Regenerative Medicine (CIRM) Annual Grantee Meeting*, San Francisco, CA, Sept 2008
7. N. S. Reyes, H. Zhu, M. P. Meyer, "Origins of Reduced Stereoselectivity in the Alpine-Borane Reduction of d-Benzaldehydes," *Gordon Research Conference on Isotopes*, Ventura, California, February 2008.
8. R. Rodriguez, J. Romo, A. Aleman, A. Camelo, J. Mowrer, M. Colvin, R. M. Ortiz, "Body mass index and waist circumference as predictors for increased systolic blood pressure in adolescents," *Society for the Advancement of Chicanos and Native Americans in Science National Conference*, Salt Lake City, UT, October 9 - 12, 2008.
9. J. R. Sanborn and J. Jasinski, "Tapered Microstructure Fibers for Fiber Optical Parametric Oscillators," *Conference on Lasers and Electro-Optics/Quantum Electronics and Laser Science Conference and Photonic Applications Systems Technologies*, OSA Technical Digest (CD) (Optical Society of America, 2008), paper CTuL7.
10. S. E. Stafford, J. D. West, M. P. Meyer, "Kinetic Isotope Effects upon Enantiotopic Groups Applied to the DIP-Cl Reduction," *Gordon Research Conference on Isotopes*, Ventura, California, February 2008.
11. J. D. West, J. Saavedra, M. P. Meyer, "Kinetic Isotope Effects upon Enantiotopic Groups Applied to the CBS Reduction" *Gordon Research Conference on Isotopes*, Ventura, California, February 2008.
12. H. Zhu, N. S. Reyes, M. P. Meyer, "Sonication Mimics Pressure Effects in Boosting Enantioselectivity in Alpine Borane Reductions," *Gordon Research Conference on Isotopes*, Ventura, California, February 2008.

2007

1. Y. Magan, M. P. Meyer, "Human β-Defensin-2 as Chemokine: Potential Avenues Toward Defensin-Based Anti-Cancer Drugs," *Society for the Advancement of Chicanos and Native Americans in Science National Conference*, Kansas City, Missouri, October 2007.
2. J. E. Sharping, J. R. Sanborn, M. A. Foster, D. Broaddhus, A. L. Gaeta, J. Lasri, O. Lyngnes, and K. Vogel, "Microstructure-Fiber-Based Ultrafast Optical Parametric Oscillators," *Frontiers in Optics*, OSA Technical Digest (CD) (Optical Society of America, 2007), paper FThJ3.

School of Engineering - Undergraduate Research Opportunities

The opportunity for undergraduates to become involved in research projects has a very strong, perhaps the strongest, positive impact on student engagement with the study of engineering.

One of the benefits that we have long espoused for UC Merced is our small size and opportunity for students to interact with faculty. But with the quality of the undergraduates that we have attracted to UC Merced, and our limited number of graduate students and graduate student funding, many extraordinary opportunities have arisen for involving undergraduates in research activities that have resulted in remarkable student experiences and accomplishments. Our students have really “stepped up to the plate,” as reflected in a few noteworthy examples:

Uday Bali, Heather Poiry, Kevin Balkoski and Rich Inman

UCM Engineering students found a unique, interdisciplinary opportunity to study the implementation of alternative energy in Denmark through the first-ever LoCal RE Summer School program organized by UC Merced, UC Davis, UC Santa Cruz, and Roskilde University in Denmark. These UC Merced engineering students have developed close relationships with one of the world's leading energy researchers, Professor Roland Winston, jointly appointed in UC Merced's schools of Natural Sciences and Engineering. All engineering four engineering participants have been involved in Winston's courses and research since they came to UC Merced. Balkoski and Bali transferred in at the opening of the university in 2005; both have now graduated and plan to pursue graduate degrees at UC Merced with Winston as their advisor. The remaining members of the group are still pursuing their bachelor's degrees. News, Pictures from Denmark

Otto Alvarez

Otto is participating in several projects using geospatial techniques to monitor and study the environmental systems in California. For example, he is working in a project to map real-time solar irradiance in California as well as distribute the spatial data via an open source webGIS technique; He is also involved in a multi-campus collaborative project to study environmental impacts of forest management on Sierra Nevada Mountains by using remote sensing techniques and geographical information systems.

Anthony Grimes, Maureen Long, and Jon Pegan

These three top Bioengineering students, under advisement of Professor Michelle Khine, have collaborated on a paper that has been accepted for publication in a leading technical journal: A. Grimes, D. Breslauer, M. Long, J. Pegan. L.P. Lee, M. Khine," Shrinky -Dink Microfluidics: Rapid Generation of Deep and Rounded Patterns". They each have significant individual accomplishments resulting from this research involvement:

- Ms. Long's presentation entitled “"Porous Scaffold for Biomimetic Blood-Air Interface of the Lung" was accepted for an oral platform presentation in at the BMES 2007 Annual Meeting.
- Mr. Pegan's presentation entitled "Quantitative Single-Cell Analysis of Receptor Dynamics and Chemotactic Response on a Chip" was also accepted for a poster presentation in the Device Technologies session of that meeting.
- Mr. Grimes won the 1st place poster award on campus for undergrads here for UC Merced Research Day, and Jon Pegan won 1st place poster award during the UC Berkeley COINS Symposium earlier this year for this work.

Eric Lam

Eric attended the RoboCup 2007 conference and international competition in Atlanta as part of UC Merced's first Robocup team led by Professor Stefano Carpin. UC Merced was the only UC campus in the competition, and tho only one comprised exclusively of undergraduate students. The team programmed a virtual robot that can perceive its surroundings, avoid obstacles and even use a movable arm to get past obstacles.

Emily Reed

Emily presented a paper co-authored by, Michael R. Dunlap, Jacek Jasinski and Professor Christopher Viney, entitled "Microstructure, Nanostructure and Properties of the Wasp Petiole" to the fall 2006 meeting of the Materials Research Society in Boston. This paper was one of four (from the >5000 presented) that was featured by "Chemical & Engineering News," the widely-read weekly publication of the American Chemical Society (15 January 2007), and discusses work related to research performed by Emily while still an undergraduate at UCM working with Professor Viney. Emily also presented a poster on this work at UC Merced's first annual Research Day in April 2007, winning first-place award in the undergraduate research category. Emily received one of two medals for Superior Presentation at the 2007 Sigma Xi Annual Meeting and Student Research Conference in Orlando.

Eric Shorr

Eric wrote a curve fitting program to fit scientific data to a complicated function developed by Chemistry Professor Anne Kelley, and was co-author of a paper that has been accepted by a peer reviewed journal: "Automated Parameter Optimization in Modeling Absorption Spectra and Resonance Raman Excitation Profiles," by Eric Shorr and Anne Myers Kelley in the Journal Physical Chemistry Chemical Physics.