

Barbara A. Lawrence

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Education

- 1991 Ph.D. degree. Physical Chemistry. University of California, Irvine.
Dissertation: "Gas Phase Photodissociation Dynamics : Resonance
Raman Spectroscopy of Alkyl Iodides"
Advisor: James J. Valentini
- 1989 M.S. degree. Chemistry, University of California, Irvine.
- 1980 B.S. degree. *cum laude*. Chemistry. University of California, Irvine.

Experience

- 2006-present Professor of Chemistry. Eastern Illinois University
- 2001-2006 Associate Professor of Chemistry. Eastern Illinois University.
- Spring, 2002 Visiting Associate Professor of Chemistry, Indiana University
- 1997-2001 Assistant Professor of Chemistry. Eastern Illinois University.
- 1993-1997 Assistant Professor of Chemistry. The Joint Science Department ,
Claremont-McKenna College, Pitzer College, and Scripps College.
- 1991-1993 Research Associate. Wellesley College.
- 1990-1991 Postdoctoral Fellow. Wellesley College

Fellowships and Awards

- 2004 Edwin May Award for Contributions to Research and External Funding
- 2003 Achievement and Contribution Award for Research
- 2002 Graduate Dean's Award for Excellence in Research
- 2001 Achievement and Contribution Award for Research
- 1998 ACS-PRF Summer Research Fellow
- 1992 ARVO/NEI Travel Fellowship
- 1992 Elected to Sigma Xi
- 1990-1991 Camille and Henry Dreyfus Teaching/Research Fellow
"Application of NMR Spectroscopy and Imaging to Biological Systems"
- 1986 UC Regents' Dissertation Fellowship
- 1980 Elected to Phi Beta Kappa

Memberships

American Chemical Society
Council on Undergraduate Research (CUR Councilor 2001-2004)
Sigma Xi
American Association for the Advancement of Science
American Microscopical Society

Research Support

NSF-MRI Grant: “MRI/RUI: Acquisition of a High Field NMR Spectrometer for Analysis of Solutions and Solids; 9/03-8/06, \$407,353 (with Dr. Ellen Keiter)

NSF-CRUI Grant: “Molecular Mechanisms of Mechanical Diversity in Spider Silks”; 9/01-8/05
\$850,000 (one of three principal investigators)

NSF-CRUI Grant: “An Integrative Study of Spider Silk Proteins and Prey Capture”; 9/97-8/01;
\$635,000 (one of five principal investigators)

Council on Faculty Research Award, 2002l \$2,830 (With Dr. M. Marjanovic)

Seed Grant from College of Sciences, Eastern Illinois University; 2000; \$500.

Supplemental Award, Camille and Henry Dreyfus Fund: “Development of Potential Contrast Agents for Magnetic Resonance Imaging”; 1996; \$10,000.

Mellon Foundation, fund administered by Harvey Mudd College: “Integrating computers in upper division physical science: modules of visualization and numerical methods”; 1996; \$12,400.

Publications

*Marjanovic, M.; #Carlson, J.; #Link, T.; #Wright, N. Lawrence, B.; Mechanisms of Freeze Avoidance in Eggs of the Antarctic Naked Dragonfish (*Gymnodraco acuticeps*) and Atlantic Tomcod (*Microgadus tomcod*), in preparation.

*Marjanovic, M.; #Rinando, V.; #Wright, N.; Lawrence, B. Metabolic Adaptations in the Skeletal Muscle of a Freeze-tolerant Frog: ³¹P NMR Study, in preparation.

Lawrence, B.A.; #Wright, N.; Werner-Zwanziger, U.; Moore, A.M. Mechanical characterization and secondary structure determination of egg case silk in the black widow spider (*Latrodectus hesperus*), in preparation.

Lawrence, B. A.; #Chiu, H.; #Wright, N.; Werner-Zwanziger, U.; Moore, A.M.F. Analysis of the Material Properties and Molecular Structure of Tarantula Silk, in preparation.

Hu, X.; Lawrence, B.; #Kohler, K.; Falick, A. M.; Moore, A.M.F.; #McMullen, E.; #Jones, P.R.; Vierra, C. Araneoid Egg Case Silk: A Fibroin with Novel Ensemble Repeat Units from the Black Widow Spider, *Latrodectus hesperus*. *Biochemistry* **2005**, *44*, 10020-10027.

Lawrence, Barbara A.; Vierra, Craig A.; Moore, Anne M.F., Molecular and Mechanical Properties of Major Ampullate Silk of the Black Widow Spider, *Latrodectus hesperus*. *Biomacromolecules* **2004**, *5*, 689-695.

*Marjanovic, M.; Lawrence, B.; #Wright, N.; #Carlson, J. DeVries, A. Osmoregulation and Freezing Avoidance in Fertilized Eggs of the Antarctic Naked Dragon Fish (*Gymnocraco acuticeps*). *The Physiologist* **2002**, *45*, 308.

Lawrence, B.A.; Moore, A.M. Spinning a Web of Interdisciplinary Research. *CUR Quarterly* 1999, *19*, 158-164.

Lawrence, B. A. Lasers. In *Encyclopedia of Science Technology and Society*, Volti, R., Ed.; Facts on File, Inc.; New York, **1999**.

Lawrence, B. A. Magnetic Resonance Imaging. In *Encyclopedia of Science Technology and Society*, Volti, R., Ed.; Facts on File, Inc.; New York, **1999**.

*Lawrence, B.A.; #Suarez, C.; #DePina, A.; #Polse, J.; #Rennke, S.; Kolodny, N.H.; Allen, M.M. Compartmentalization of Polyphosphate in the Cyanobacterium *Synechocystis* sp. PCC 6308: a ^{31}P NMR Spectroscopic and Electron Microscopic Study. *Archives of Microbiology* **1998**, *169*, 195.

*Lawrence, B.A.; #DePina, A.; #Polse, J.; Allen, M.M.; Kolodny, N.H. ^{31}P NMR Identification of Metabolites and pH Determination in the Cyanobacterium *Synechocystis* sp. PCC6308. *Current Microbiology* **1997**, *34*, 280.

Kolodny, N. H.; Freddo, T. F.; Lawrence, B. A.; #Suarez, C.; Bartels, S. P. Contrast-Enhanced MRI Confirmation of an Anterior Protein Pathway in Normal Rabbit Eyes. *Investigative Ophthalmology and Visual Science* **1996**, *37*, 1602-1607.

Lawrence, B. A.; Zanella, A. A Simple Method for Producing a Mixture of Gaseous HCl and DCl for Measuring their Vibration-Rotation Spectra. *Journal of Chemical Education* **1996**, *73*, 367.

Kolodny, N. H.; Bartels, S. P.; Lawrence, B. A. Confirmation by Magnetic Resonance Imaging of the Diffusional Pathway between the Ciliary Processes and the Anterior Chamber in the Owl Monkey. *Investigative Ophthalmology and Visual Science* **1993**, *34*, 921.

Lawrence, B. A.; Weinberg, D. V.; Kolodny, N. H.; D'Amico, D.J.; Gragoudas, E. S. Assessment of the Blood/Ocular barriers by MRI and Fluorophotometry, a Comparative Study. *Investigative Ophthalmology and Visual Science* **1992**, *33*, 1125.

Phillips, D.L.; Lawrence, B.A.; Valentini, J.J. Substituent Effects on Gas-Phase Photodissociation Dynamics: Resonance Raman Spectra of Ethyl Iodide, Isopropyl Iodide, and tert-Butyl Iodide. *J. Phys. Chem.* **1991**, *95*, 9085.

Phillips, D.L.; Lawrence, B.A.; Valentini, J.J. Resonance Raman Spectra of Trans and Gauche Isomers of n-Propyl Iodide: Evidence for the Dependence of Photodissociation Dynamics on Geometrical Conformation. *J. Phys. Chem.* **1991**, *95*, 7570.

#Student co-authors

Conference Presentations

- **American Chemical Society National Meeting, Chicago, IL (March, 2007)** "Investigation of the Silk of the Common Chilean Tarantula, *Grammosola rosea*, Using Solid State NMR Spectroscopy" (Presentation given by Michael Cuddy, undergraduate researcher)
- ***American Chemical Society National Meeting, Chicago, IL (March, 2007)** "Study of freeze-avoidance in the ooplasm of an Antarctic fish, *Gymnodraco acuticeps*, using NMR spectroscopy"
- ***RISC Showcase, University of Southern Indiana, Evansville, IN (April, 2005)** "Mechanisms of Freeze Avoidance in the Eggs of Antarctic Naked Dragonfish (*Gymnodraco acuticeps*) and Atlantic Tomcod (*Microgadus tomcod*)" (Presentation given by Jeremy Carlson, undergraduate researcher)
- **XXXV International Congress of Physiological Sciences, San Diego, CA (April, 2005)** "Macroscopic and molecular structure of egg case silk protein from the black widow spider, *Latrodectus hesperus*"

- ***XXXV International Congress of Physiological Sciences, San Diego, CA** (April, 2005)
“Possible role of phosphodiesterases in cold tolerance”
- **Invited seminar:** Department of Chemistry, University of Missouri at Columbia, “Happy Creepy-Crawly Halloween: A Comparative Study of Spider Silks from Black Widow and Tarantula”, October 2004.
- ***Council on Undergraduate Research, 11th National Conference, La Crosse, WI** (June, 2004)
“Interdisciplinary Research: How to get started and make it work”
- **Third International Silk Symposium, Montreal, Que.** (June, 2003) “Molecular and Mechanical Properties of Major Ampullate Silk of the Black Widow Spider, *Latrodectus hesperus*”
- **XXth International Conference on Magnetic Resonance In Biological Systems, Toronto, Ont.** (August, 2002) “Characterization of Tarantula Silk Using Carbon-13 CP-MAS Solid State NMR Spectroscopy” (with Nick Wright, graduate student)
- **Society for Integrative and Comparative Biology Annual Meeting, Anaheim, CA** (January, 2002) “Molecular Structure and Material Properties in Tarantula Silk”
- ***Council on Undergraduate Research, 9th National Conference, Wooster, OH** (June, 2004)
“Interdisciplinary Research: How to get started and make it work”
- **Council on Undergraduate Research, 8th National Conference, Los Angeles, CA** (June, 2000)
“Spider Silk Proteins and Prey Capture: An Undergraduate-Centered, Interdisciplinary Research Program”
- ***Experimental Biology 2001, Orlando FL** (April, 2001) “Metabolic Adaptations in the Skeletal Muscle of a Freeze-tolerant Frog: ³¹P NMR Study” (with Victoria Rinando, undergraduate student)
- **Society for Integrative and Comparative Biology Annual Meeting, Chicago, IL** (January, 2001)
“Mechanical characterization of egg case silk in the black widow spider (*Latrodectus hesperus*)”
- ***Eleventh Annual Argonne Symposium for Undergraduates in Science, Engineering and Mathematics, Argonne, IL**, (November, 2000) “Effect Of Temperature On The Skeletal Muscle Of A Freeze-Tolerant Frog: ³¹P-NMR Study” (given by Victoria Rinando, undergraduate student)
- **Eleventh Annual Argonne Symposium for Undergraduates in Science, Engineering and Mathematics, Argonne, IL**, (November, 2000) “Secondary Protein Structure of The Dragline Silk Of The Black Widow Spider Using C¹³ NMR” (given by Ben Bomer, undergraduate student)
- **Eleventh Annual Argonne Symposium for Undergraduates in Science, Engineering and Mathematics, Argonne, L**, (November, 2000) “Analysis Of Protein Composition From The Silk of The Tarantula Spider” (given by Todd Meyer, undergraduate student)
- **Council on Undergraduate Research, 8th National Conference, Los Angeles, CA** (June, 2000)
“Spider Silk Proteins and Prey Capture: An Undergraduate-Centered, Interdisciplinary Research Program”
- **American Chemical Society National Meeting, San Francisco, CA** (March, 2000) “Secondary Structure of Egg Case Silk from *Latrodectus hesperus* (Black Widow Spider)” (with Tascha Funk, undergraduate student)
- **Society for Integrative and Comparative Biology Annual Meeting, Atlanta, GE** (January, 2000)
“Secondary Structure of Dragline Silk Protein from *Latrodectus hesperus* ” (with by Ben Bomer, undergraduate student)
- ***SigmaXi National Forum, Minneapolis, MN (October, 1999)** “Interdisciplinary Research as an Educational Tool”
- **Ninth Annual Argonne Symposium for Undergraduates in Science, Engineering and Mathematics, Argonne, IL**, (November, 1998) “Collection and Analysis of Silks of *Latrodectus Hesperus* (Black Widow) for Solid State Carbon-13 NMR Spectroscopy” (given by Tascha Funk, undergraduate student)
- **Council on Undergraduate Research, 7th National Conference, Los Angeles, CA** (June, 1998)
“Spider Silk Proteins and Prey Capture: An Undergraduate-Centered, Interdisciplinary Research Program”
- **American Chemical Society National Meeting, Las Vegas, NV** (September, 1997) “Hands-on Student Use of FT-NMR in the Organic and Upper Division Chemistry Laboratories”
- **Western Spectroscopy Conference, Asilomar, CA** (October, 1995) "Proton and Carbon One- and Two-Dimensional NMR Spectra of 8- Hydroxyquinoline, its N-Oxide and their 5-Carbonyl Derivatives"

- **XV International Conference on Magnetic Resonance In Biological Systems, Jerusalem, Israel** (August, 1992) "³¹P NMR Spectroscopy as a Probe of Phosphate Metabolism in the *Cyanobacterium Synechocystis* PCC6308"
- **Association for Research in Vision and Ophthalmology, Sarasota, FL** (May, 1992) "Confirmation by Magnetic Resonance Imaging of the Diffusional Pathway between the Ciliary Processes and the Anterior Chamber"
- **Society of Magnetic Resonance in Medicine, San Francisco, CA** (August 1991) "Fluorescent Magnetic Resonant Contrast Agent for Ocular Imaging"
- **American Physical Society, Anaheim, CA** (March, 1989) "Photodissociation Dynamics Projected into the Frequency Domain: Resonance Raman Spectroscopy of Complex Alkyl Iodides."

* indicates publications and presentation applicable to the current proposal

Undergraduate Research Students Supervised

Tascha Funk	David Rotch
Jill Martin	Leah Rhoads
Jeff Hebenstreit	Jessica Horowitz
Tina Funk	Michael Cuddy
Ben Bomer	Brandon Jutras
Todd Meyer	Troy Link
Victoria Rinando (with M. Marjanovic)	Jeremy Carlson (with M. Marjanovic)
Carolyn Rulis	Nick Wright

Graduate Research Student Supervised

Nick Wright

Courses Taught

CHM1310	General Chemistry I	CHM1315	General Chemistry Lab I
CHM1410	General Chemistry II	CHM1415	General Chemistry Lab II
CHM1510	General Chemistry II	CHM3915	Physical Chemistry Lab
CHM 3910	Physical Chemistry I	CHM3780	Instrumental Analysis
CHM3920	Physical Chemistry II	CHM4770	Molecular Spectroscopy
CHM3000-3001	Junior Seminar	CHM5250	Statistical Thermodynamics
CHM4000-4001	Senior Seminar	CHM5250	NMR Spectroscopy
CHM5000-5001	Graduate Seminar		

Committee Work

University-wide

Faculty Senate (2001-2004) (Vice Chair 2003-2004)
 Council on Undergraduate Research (Chair 2000-2001)
 Undergraduate Research Council
 Women's Advocacy Council
 Sigma Xi (Vice President-2000-2001; President 2001-2002)

College-wide

COS Dean's Priorities Committee (1997-1998)

Departmental

Assessment (Chair 2000-2001)	Curriculum
K-8 Outreach (Chair 1999-2000)	Undergraduate Research
American Chemical Society Student Affiliates Sponsor	
Graduate Committee (Chair and Graduate Coordinator 2004-2006)	
Search committees 1999-2005 (Chair 2003-2004)	