

## **CURRICULUM VITAE**

### **DAVID PETER GIEDROC**

#### **PERSONAL:**

Title: Professor of Chemistry and Chair of Department  
Address: 212 S. Hawthorne Drive  
Department of Chemistry  
Indiana University  
320A Simon Hall  
Bloomington, IN 47405-7003  
Phone: (812) 856-3178  
Fax: (812) 856-5710  
E-mail: giedroc@indiana.edu  
Nationality: US citizen  
Date of Birth: October 6, 1959

#### **EDUCATION:**

1980	B.S.	Pennsylvania State University (Biochemistry)
1984	Ph.D.	Vanderbilt University (Biochemistry)
1984 to 1988	Postdoctoral	Yale University (Biochemistry and Biophysics)

#### **EXPERIENCE:**

1980 to 1981	Research Assistant with Prof. Joseph J. Villafranca Pennsylvania State University, Department of Chemistry
1981 to 1983	Graduate Trainee with Prof. David Puett Vanderbilt University, Department of Biochemistry
1983 to 1984	Graduate Research Assistant with Prof. David Puett University of Miami, Department of Biochemistry
1984 to 1986	Postdoctoral Research Associate with Prof. Joseph E. Coleman Yale University, Department of Molecular Biophysics & Biochemistry
1986 to 1988	NIH Postdoctoral Research Fellow with Prof. Joseph E. Coleman Yale University, Department of Molecular Biophysics & Biochemistry
1988 to 1994	Assistant Professor of Biochemistry, Texas A&M University
1991 to 1999	Member, Institute of Biosciences and Technology Center for Macromolecular Design, Texas A&M University
1994 to 1999	Associate Professor of Biochemistry, Texas A&M University
1999 to 2007	Professor of Biochemistry, Texas A&M University
1999 to 2007	Director, Center for Advanced Biomolecular Research
1999 to 2007	Faculty Director, Biomolecular NMR Laboratory
2001 to 2002	Visiting Professor, The Scripps Research Institute
2002	Visiting Professor, University of Zürich
2005 to 2007	Director, NIH Molecular Biophysics Training Program

2007 to present Professor of Chemistry, Indiana University  
2010 to 2014 Chair, Department of Chemistry, Indiana University

### **HONORS:**

1986 to 1988 NIH Postdoctoral Fellowship  
1990 to 1992 American Cancer Society Junior Faculty Research Awardee  
1997 to 2001 Member, Editorial Board, *Journal of Biological Chemistry*  
1999 Ad hoc Full member, Molecular and Cellular Biophysics (BBCA) SS, NIH  
2001 to 2006 Full member, Cancer Drug Development Peer Review Committee, American Cancer Society  
2001 Ad hoc Full Member, Special Emphasis Panel SSS-B SS, NIH  
2001 Ad hoc Full Member, SSS-A(1) SS, NIH  
2001 to 2006 Faculty Fellow, Texas A&M University  
2002 Ad hoc Full Member, ZRG1 BBCB SS, NIH  
2003 Ad hoc Full Member, ZRG1 SSS-B SS, NIH  
2003 Ad hoc Full Member, BBCA SS, NIH  
2004 Faculty Fellow, Texas Agricultural Experiment Station  
2004 Ad hoc Full Member, ZRG1 SS, NIH  
2004 Ad hoc Full Member, BMT SS, NIH  
2005 Mail reviewer, ZRG1 BCMB-Q SS, NIH  
2006 to 2010 Full Member, BRT-B (Biomedical Research Training) SS, NIH  
2010 Plenary Speaker, *GRASP 2010*  
2011 Full reviewer, Program Project Grant, NIH  
2011 Plenary Speaker, *ICBIC-15*  
2011 Chair, *Cell Biology of Metals* Gordon Research Conference

### **PROFESSIONAL SOCIETIES:**

American Association for the Advancement of Science; American Chemical Society; Protein Society; American Society for Biochemistry and Molecular Biology; Biophysical Society; Society of Biological Inorganic Chemistry

### **EXTRAMURAL GRANT SUPPORT (total costs):**

#### **Career (1990-present):**

Fifteen awards totaling \$11,168,250 as Principal Investigator and six awards totaling \$400,614 as co-Principal Investigator or co-Investigator

#### **Current:**

NIH R01 GM042569 (19-22) (Giedroc), *Structure and Mechanism of Metalloregulatory Proteins*, \$1,284,616, 7/01/08-4/30/12

NIH R01 AI067416 (01-05) (Giedroc), *Novel RNA Structures in Coronavirus Replication*, \$1,824,117 (shared with one sub-contractor), 01/01/08-12/31/12

D. P. Giedroc: Curriculum Vitae (May 2011)

NIH R01 GM097225 (01-05) (Giedroc), *New Mechanisms of Sulfur Sensing and Trafficking in Staphylococcus aureus*, \$1,071,984, 4/01/11-3/31/15

**Previous:**

NIH R01 AI040187 (08-11) (Giedroc), *Structure and Folding of Frameshifting mRNA Pseudoknots*, \$1,238,611 (shared with one sub-contractor), 8/1/03-1/31/07 (no-cost extension to 1/31/08)

NIH T32 GM065088 (01-05) (Giedroc), *Graduate Training in Molecular Biophysics*, \$617,260, 7/1/03-6/30/08

Robert A. Welch Foundation A-1295 (Giedroc), *Coordination Chemistry of Metal Complexes in Metal Sensor Proteins*, \$165,000, 6/1/04 to 5/31/07

Texas A&M University Life Science Task Force (Campbell), *Proposal for an Ocean Health Observing Systems Platform*, \$66,000, 9/1/03 to 8/31/06 (intramural).

Texas Higher Education Coordinating Board (THECB) Advanced Research Program 010366-0172-2001 (DeRose), *19-F Nuclear Magnetic Resonance Probes of RNA Structure and Dynamics*, \$52,175, 1/1/02 to 8/31/04.

NIH R01 GM042569 (10-13) (Giedroc), *Zinc Coordination and Regulation of Zinc Metalloproteins*, \$987,760, 4/1/00 to 3/31/04

NIH R01 AI40187 (04-07) (Giedroc), *Structure, Stability and Dynamics of RNA Pseudoknots*, \$839,059 (shared with one sub-contractor), 9/1/99-8/31/03

Texas Higher Education Coordinating Board (THECB) Advanced Research Program 010361-0278-1999 (DeRose), *RNA Structure, Metal Sites, and Dynamics using Site-Specific Isotopic Labels*, \$72,080, 1/1/00 to 12/31/01

NSF DBI-9970232, Multi-user Equipment Program (Giedroc), *High Field NMR Instrumentation for Structural Studies of Proteins and Nucleic Acids*, \$390,000, 4/1/99-3/31/00

Robert A. Welch Foundation A-1295 (Giedroc), *Coordination Chemistry of Zn(II) Complexes in Nucleic Acid Binding Proteins*, \$145,000, 6/1/01 to 5/31/04

NIH R01 GM42569 (06-09) (Giedroc), *Zinc Coordination and Regulation of Zinc-Finger Proteins*, \$658,880, 4/1/96 to 3/31/00

NIH R01 AI40187 (01-03) (Hoffman), *Structure and Stability of RNA Pseudoknots*, \$254,359, 8/1/96 to 7/31/99

Robert A. Welch Foundation A-1295 (Giedroc), *Coordination Chemistry of Zn(II) Complexes in Nucleic Acid Binding Proteins*, \$132,000, 6/1/98 to 5/31/01

NIH R29 GM42569 (01-05) (Giedroc), *Zinc Domain Structure and Function in T4 Gene 32 Protein*,

D. P. Giedroc: Curriculum Vitae (May 2011)

\$491,039, 4/1/91 to 3/31/96

Robert A. Welch Foundation A-1295 (Giedroc), *Coordination Chemistry of Zn(II) Complexes in Nucleic Acid Binding Proteins*, \$109,000, 6/1/95 to 5/31/98

NSF BIR-9217413, Biological Instrumentation Resources Program (Giedroc), *Acquisition of a 500 MHz Nuclear Magnetic Resonance Spectrometer*, \$274,813 (50% of costs; 50% matching funds raised from System sources), 9/1/93 to 8/31/96

American Cancer Society Junior Faculty Research Award JFRA-270 (Giedroc), *Assembly and Genomic RNA Packaging in Animal Retroviruses*, \$88,500, 1/1/90 to 12/31/92

### **INVITED DEPARTMENTAL RESEARCH SEMINARS:**

- 1988 Department of Molecular Virology and Carcinogenesis, National Cancer Institute-Frederick Cancer Research Facility, Frederick, MD
- 1991 Department of Chemistry, University of Texas at Austin
- 1991 Department of Chemistry, Texas A&M University
- 1992 Department of Biological Chemistry, University of Michigan Medical School
- 1992 Department of Biochemistry, Baylor College of Medicine, Houston, TX
- 1994 Department of Chemistry and Biochemistry, University of Delaware, Newark, DE
- 1997 Department of Chemistry, University of Nebraska
- 1997 Department of Biochemistry and Molecular Genetics, University of Alabama-Birmingham
- 1998 Department of Biochemistry, University of Vermont College of Medicine
- 1999 Department of Cell and Molecular Biology, University of Texas at Dallas
- 2000 Department of Biochemistry and Molecular Biophysics, Washington University School of Medicine
- 2000 Department of Biochemistry and Molecular Biology, University of Chicago
- 2000 Department of Medicinal Chemistry, Purdue University
- 2000 Department of Chemistry, Indiana University
- 2000 Department of Human Biological Chemistry and Genetics, University of Texas Medical Branch at Galveston
- 2000 Department of Chemistry, Northwestern University
- 2000 Department of Chemistry, University of Texas at Arlington
- 2001 Department of Biochemistry and Molecular Biology, Wayne State University
- 2001 Department of Chemistry, University of Michigan
- 2001 Department of Biochemistry and Molecular Biophysics, University of Arizona
- 2002 Department of Molecular Biology, University of Zürich, Switzerland
- 2002 Department of Chemistry and Biochemistry, University of California, San Diego
- 2003 Department of Biochemistry, University of Missouri-Columbia
- 2003 Department of Mathematics and Physics, Royal Veterinary and Agricultural University (KVL), Copenhagen, Denmark
- 2003 Department of Bioinformatics, University of the Saarlands, Saarbrücken, Germany
- 2003 Department of Biosciences, University of Birmingham, Birmingham, UK
- 2003 School of Biosciences, University of Newcastle-upon-Tyne, Newcastle, UK

- 2003 Department of Biochemistry, University of Utah
- 2003 Department of Pharmaceutical Sciences, University of Tokyo, Bunkyo-ku, Tokyo
- 2003 Research Institute for Bioresources, Okayama University, Kurashiki, Japan
- 2003 Department of Chemistry, Kitasato University, Kitasato, Japan
- 2004 Department of Biochemistry and Molecular Biophysics, Washington University School of Medicine
- 2004 Department of Pathology, Texas A&M University
- 2004 Department of Chemistry, University of Iowa
- 2004 Center for Integrative Bioscience, Okazaki National Research Institutes, Okazaki, Japan
- 2004 Department of Pharmaceutical Sciences, University of Maryland, Baltimore
- 2004 Department of Pharmaceutical Sciences, University of Colorado HSC, Denver
- 2005 Department of Biochemistry and Molecular Biology, University of Colorado HSC, Denver
- 2005 Department of Biochemistry and Molecular Biology, University of Massachusetts Medical School
- 2006 Department of Chemistry, Indiana University
- 2006 Department of Chemistry, Wayne State University
- 2006 Department of Cell Biology and Molecular Genetics, University of Maryland
- 2007 Department of Chemistry and Biochemistry, University of California, Los Angeles
- 2007 Department of Biology, Indiana University
- 2008 Department of Chemistry, University of Toledo
- 2008 Department of Biochemistry and Molecular Biology, Indiana University School of Medicine, IUPUI
- 2008 Department of Chemistry, Virginia Tech
- 2008 Department of Chemistry, University of Chicago
- 2008 Department of Molecular Physiology and Biological Physics, University of Virginia School of Medicine
- 2008 Department of Chemistry, St. Louis University
- 2009 Department of Biochemistry and Molecular Biology, Medical University of South Carolina
- 2009 Department of Chemistry and Biochemistry, University of South Carolina
- 2009 Department of Biochemistry, University of Illinois Urbana-Champaign
- 2010 Department of Biochemistry, Molecular and Cell Biology, Northwestern University
- 2010 Department of Chemistry, Michigan State University
- 2010 Department of Biology, Illinois State University
- 2010 Department of Chemistry and Biochemistry, Miami (OH) University
- 2011 Department of Biochemistry and Molecular Biology, Wayne State University
- 2011 Department of Chemistry and Biochemistry, Ohio State University
- 2011 Department of Biochemistry and Molecular Biology, University of Georgia
- 2011 Department of Chemistry and Biochemistry, University of Arkansas, Fayetteville
- 2011 Department of Biochemistry, Vanderbilt University

**INVITED SYMPOSIUM LECTURES:**

- 1993 Workshop on Single-Strand Binding Proteins, 1993 Biophysical Society Annual

- Meeting
- 1993 Inorganic Biochemistry Summer Workshop, University of Georgia, Athens, GA
- 1995 Inorganic Biochemistry Summer Workshop, University of Georgia, Athens, GA  
International Workshop on Bacteriophages, Salamanca, Spain
- 1996 Gibbs Biothermodynamics Conference, Carbondale, IL
- 1999 Gibbs Biothermodynamics Conference, Carbondale, IL
- 2001 *Metals and Cells*, Canterbury, UK
- 2002 *Metals in Biology* Gordon Conference, Ventura, CA
- 2002 *Zinc Signals 2002*, Grand Cayman, British West Indies
- 2003 *Proteins* Gordon Conference, New Hampshire
- 2003 *Sonderforschungsbereich 579: RNA-Ligand Interactions*, Frankfurt-am-Main, Germany
- 2003 *First International Symposium on Biomolecular Chemistry*, Awaji Island, Japan
- 2004 *FASEB Conference on Trace Element Metabolism*, Snowmass, CO
- 2004 *4th Symposium on Chemical Biology of Metal Sensors*, Yokohama, Japan
- 2005 *Cell Biology of Metals* Gordon Conference (discussion leader), Lewiston, ME
- 2005 *12<sup>th</sup> International Conference on Bioinorganic Chemistry (ICBIC-12)*, Ann Arbor, MI
- 2006 *Eurobic8*, Aveiro, Portugal
- 2006 *6th International Copper Meeting*, Alghero, Sardinia
- 2007 *Molecular Science and Chemical Biology of Biomolecular Function*, Okazaki, Japan
- 2008 *Conference BioMetals 2008*, Santiago de Compostella, Spain
- 2009 *14<sup>th</sup> International Conference on Bioinorganic Chemistry (ICBIC-14)*, Nagoya, Japan
- 2009 *Cell Biology of Metals* Gordon Conference, Newport, RI
- 2010 *Penn State Summer Symposium in Molecular Biology*, University Park, PA
- 2010 *FASEB Conference on Trace Metal Metabolism*, Snowmass, CO
- 2010 *Biometals 2010*, Tucson, AR
- 2010 *24<sup>th</sup> Annual Symposium of the Protein Society*, San Diego, CA
- 2010 *Utah Biometals Symposium*, Salt Lake City, UT
- 2010 *GRASP Biomolecular NMR Conference 2010*, Plenary Lecturer, Lawrence, KS
- 2010 *Pacificchem 2010*, Honolulu, HI
- 2011 *The Puett Symposium*, Athens, GA
- 2011 *15<sup>th</sup> International Conference on Bioinorganic Chemistry (ICBIC-15)*, Vancouver, BC

## **PUBLICATIONS (110):**

- 1) GIEDROC, D. P., Puett, D., Ling, N., & Staros, J. V. (1983) Demonstration by Covalent Cross-linking of a Specific Interaction Between  $\beta$ -Endorphin and Calmodulin. *J. Biol. Chem.* **258**, 16-19.
- 2) Puett, D., GIEDROC, D. P. & Tollefson, S. (1983) *des*-(1-13) Human  $\beta$ -Endorphin Interacts with Calmodulin. *Peptides* **4**, 191-194.
- 3) GIEDROC, D. P., Ling, N., & Puett, D. (1983) Identification of  $\beta$ -Endorphin Residues 14-25 as a Region Involved in the Inhibition of the Calmodulin-Stimulated Phosphodiesterase Activity. *Biochemistry* **22**, 5584-5591.
- 4) Colombo, G., Rajashekhar, B., GIEDROC, D. P., & Villafranca, J.J. (1984) Alternate

Substrates of Dopamine- $\beta$ -Hydroxylase. I. Kinetic Investigations of Benzyl Cyanides as Substrates and Inhibitors. *J. Biol. Chem.* **259**, 1593-1600.

5) Colombo, G., GIEDROC, D. P., Rajashekhar, B., & Villafranca, J. J. (1984) Alternate Substrates of Dopamine- $\beta$ -Hydroxylase. II. Inhibition by Benzyl Cyanides and Reactivation of Inhibited Enzyme. *J. Biol. Chem.* **259**, 1601-1606.

6) Colombo, G., Rajashekhar, B., GIEDROC, D. P., & Villafranca, J. J. (1984) Mechanism-Based Inhibitors of Dopamine- $\beta$ -Hydroxylase: Inhibition by 2-Bromo-3-(*p*-hydroxyphenyl)-1-propene. *Biochemistry* **23**, 3590-3598.

7) GIEDROC, D. P., Keravis, T. M., Staros, J. V., Ling, N., Wells, J. N., & Puett, D. (1985) Functional Properties of Covalent  $\beta$ -Endorphin Peptide/Calmodulin Complexes. Chlorpromazine Binding and Phosphodiesterase Activation. *Biochemistry* **24**, 1203-1211.

8) GIEDROC, D. P., & Puett, D. (1985) Binding of a Synthetic  $\beta$ -Endorphin Peptide to Calmodulin. *Mol. Pharmacol.* **28**, 588-593.

9) GIEDROC, D. P., Sinha, S. K., Brew, K., & Puett, D. (1985) Differential Trace Labeling of Calmodulin: Investigation of Binding Sites and Conformational States by Individual Lysine Reactivities. *J. Biol. Chem.* **260**, 13406-13413.

10) GIEDROC, D. P., & Coleman, J. E. (1986) Structural and Functional Differences between the Two Intrinsic Zinc Ions of *Escherichia coli* RNA Polymerase. *Biochemistry* **25**, 4969-4978.

11) GIEDROC, D. P., Keating, K. M., Williams, K. R., Konigsberg, W. H., & Coleman, J. E. (1986) Gene 32 Protein, The Single-Stranded DNA Binding Protein from T4, is a Zinc Metalloprotein. *Proc. Natl. Acad. Sci. USA* **83**, 8452-8456.

12) GIEDROC, D. P., Puett, D., Sinha, S. K., & Brew, K. (1987) Calcium Effects on Calmodulin Lysine Reactivities. *Arch. Biochem. Biophys.* **252**, 136-144.

13) GIEDROC, D. P., Keating, K. M., Williams, K. R., & Coleman, J. E. (1987) The Function of Zinc in Gene 32 Protein from T4. *Biochemistry* **26**, 5251-5259.

14) Keating, K. M., Ghosaini, L. R., GIEDROC, D. P., Williams, K. R., Coleman, J. E., & Sturtevant, J. M. (1988) Thermal Denaturation of T4 Gene 32 Protein. The Effects of Zinc Removal and Substitution. *Biochemistry* **27**, 5240-5245.

15) GIEDROC, D. P., Johnson, B. A., Armitage, I. M., & Coleman, J. E. (1989) NMR Spectroscopy of  $^{113}\text{Cd(II)}$ -Substituted Gene 32 Protein. *Biochemistry* **28**, 2410-2418.

16) Pan, T., GIEDROC, D. P., & Coleman, J. E. (1989)  $^1\text{H}$  NMR Studies of T4 Gene 32 Protein: Effects of Zinc Removal and Reconstitution. *Biochemistry* **28**, 8828-8832.

17) GIEDROC, D. P., Khan, R., & Barnhart, K. (1990) Overexpression, Purification, and

Characterization of Recombinant T4 Gene 32 Protein<sub>22-301</sub> (g32P-B). *J. Biol. Chem.* **265**, 11444-11455.

18) GIEDROC, D. P., Khan, R., & Barnhart, K. (1991) Site-specific 1,<sup>M</sup>6-Ethenoadenylated Single-stranded Oligonucleotides as Structural Probes for the T4 Gene 32 Protein-ssDNA Complex. *Biochemistry* **30**, 8230-8242.

19) GIEDROC, D. P., Qiu, H., Khan, R., King, G. C., & Chen, K. (1992) Zn(II) Coordination Domain Mutants of T4 Gene 32 Protein. *Biochemistry* **31**, 765-774.

20) Khan, R. & GIEDROC, D. P. (1992) Recombinant HIV-1 Nucleocapsid (NCP<sup>7</sup>) Protein Unwinds tRNA. *J. Biol. Chem.* **267**, 6689-6695.

21) Dib-Hajj, F., Khan, R., & GIEDROC, D. P. (1993) Retroviral Nucleocapsid Proteins Possess Potent Nucleic Acid Strand Renaturation Activity. *Prot. Sci.* **2**, 231-243.

22) Jiang, H., GIEDROC, D., & Kodadek, T. (1993) The Role of Protein-Protein Interactions in the Assembly of the Presynaptic Filament for T4 Homologous Recombination. *J. Biol. Chem.* **268**, 7904-7911.

23) Villemain, J. L., & GIEDROC, D. P. (1993) Energetics of Arginine-4 Substitution Mutants in the N-terminal Cooperativity Domain of T4 Gene 32 Protein. *Biochemistry* **32**, 11235-11246.

24) Qiu, H., Kodadek, T. & GIEDROC, D. P. (1994) Zinc-Free and Reduced T4 Gene 32 Protein Binds Single-stranded DNA Weakly and Fails to Stimulate UvsX-Catalyzed Homologous Recombination. *J. Biol. Chem.* **269**, 2773-2781.

25) Qiu, H., & GIEDROC, D. P. (1994) Effects of Substitution of Proposed Zn(II) Ligand His-81 or His-64 in Phage T4 Gene 32 Protein: Spectroscopic Evidence for a Novel Zinc Coordination Complex. *Biochemistry* **33**, 8139-8148.

26) Khan, R. & GIEDROC, D. P. (1994) Nucleic Acid Binding Properties of Recombinant Zn<sub>2</sub> HIV-1 Nucleocapsid Protein are Modulated by COOH-Terminal Processing. *J. Biol. Chem.* **269**, 22538-22546.

27) Peliska, J. A., Balasubramanian, S., GIEDROC, D. P., & Benkovic, S.J. (1994) Recombinant HIV-1 Nucleocapsid Protein Accelerates HIV-1 Reverse Transcriptase Catalyzed DNA Strand Transfer Reactions and Modulates RNase H Activity. *Biochemistry* **33**, 13817-13823.

28) Guo, J., Wang, S., Dong, J., Qiu, H., Scott, R. A., & GIEDROC, D. P. (1995) X-ray and Visible Absorption Spectroscopy of Wild-Type and Mutant T4 Gene 32 Proteins: His<sup>64</sup>, not His<sup>81</sup>, is the Non-thiolate Zinc Ligand. *J. Amer. Chem. Soc.* **117**, 9437-9440.

29) Qiu, H., Kaluarachchi, K., Du, Z., Hoffman, D. W., & GIEDROC, D. P. (1996) Thermodynamics of Folding of the RNA Pseudoknot of the T4 Gene 32 Autoregulatory

Messenger RNA. *Biochemistry* **35**, 4176-4186.

- 30) Du, Z., GIEDROC, D. P., & Hoffman, D. W. (1996) Structure of the Autoregulatory Pseudoknot within the Gene 32 Messenger RNA of Bacteriophages T2 and T6: A Model for a Possible Family of Structurally Related RNA Pseudoknots. *Biochemistry* **35**, 4187-4198.
- 31) Khan, R., Chang, H.-O., Kaluarachchi, K., & GIEDROC, D. P. (1996) Interaction of Retroviral Nucleocapsid Proteins with Transfer RNA<sup>phe</sup>: A Lead Ribozyme and <sup>1</sup>H NMR Study. *Nuc. Acids Res.* **24**, 3568-3575.
- 32) Villemain, J. L. & GIEDROC, D. P. (1996) Characterization of a Cooperativity Domain Mutant Lys<sup>3</sup>→Ala (K3A) T4 Gene 32 Protein. *J. Biol. Chem.* **271**, 27623-27629.
- 33) Rosche, W. A., Jaworski, A., Kang, S., Kramer, S. F., Larson, J. E., GIEDROC, D. P., Wells, R. D., & Sinden, R. R. (1996) Single-stranded DNA-Binding Protein Enhances the Stability of CTG Triplet Repeats in *Escherichia coli*. *J. Bacteriol.* **178**, 5042-5044.
- 34) Villemain, J. L., & GIEDROC, D. P. (1996) The N-terminal Domain of T4 Gene 32 Protein Modulates the Lifetime of Cooperatively Bound Gp32-ss Nucleic Acid Complexes. *Biochemistry* **35**, 14395-14404.
- 35) Guo, J., & GIEDROC, D. P. (1997) Zinc Site Redesign in T4 Gene 32 Protein: Structure and Stability of Co(II)-Complexes Formed by Wild-Type and Metal-Ligand Substitution Mutants. *Biochemistry* **36**, 730-742.
- 36) Liu, M. Y., Gui, G., Wei, B., Preston, J.F. III, Oakford, L., Yükei, Ü., GIEDROC, D. P., & Romeo, T. (1997) The RNA Molecule CsrB Binds to the Global Regulatory Protein CsrA and Antagonizes its Activity in *Escherichia coli*. *J. Biol. Chem.* **272**, 17501-17510.
- 37) Du, Z., Holland, J. A., Hansen, M. R., GIEDROC, D. P., & Hoffman, D. W. (1997) Base Pairings Within the RNA Pseudoknot Associated with the Simian Retrovirus-1 *gag-pro* Frameshift Site. *J. Mol. Biol.* **270**, 464-470.
- 38) Namgoong, S.-Y., Kim, K., Saxena, P., Yang, J.-Y., Jayaram, M., GIEDROC, D. P., & Harshey, R. M. (1997) Mutational Analysis of Domain IIb of Mu Transposase: Domains IIa and IIb belong to Different Catalytic Complementation Groups. *J. Mol. Biol.* **275**, 221-232.
- 39) Theimer, C. A., Wang, Y., Hoffman, D. W., Krisch, H. M., & GIEDROC, D. P. (1998) Non-Nearest Neighbor Effects on the Thermodynamics of Unfolding of a Model mRNA Pseudoknot. *J. Mol. Biol.* **279**, 545-564.
- 40) Chen, X., Agarwal, A., & GIEDROC, D. P. (1998) Structural and Functional Heterogeneity Among the Zinc-Fingers of Human MRE-Binding Transcription Factor-1 (MTF-1). *Biochemistry* **37**, 11152-11161.
- 41) Gao, Y., Kaluarachchi, K., & GIEDROC, D. P. (1998) Solution Structure and Backbone

Dynamics of Mason-Pfizer Monkey Virus (MPMV) Nucleocapsid Protein. *Prot. Sci.* **7**, 2265-2280.

42) Nixon, P. L., & GIEDROC, D. P. (1998) Equilibrium Unfolding (Folding) Pathway of a Model H-type Pseudoknotted RNA: The Role of Magnesium Binding in Stability. *Biochemistry* **37**, 16116-16129.

43) Theimer, C. A. & GIEDROC, D. P. (1999) Equilibrium Unfolding Pathway of an H-type RNA Pseudoknot which Promotes Programmed -1 Ribosomal Frameshifting. *J. Mol. Biol.* **289**, 1283-1299.

44) Nixon, P. L., Theimer, C. A., & GIEDROC, D. P. (1999) Thermodynamics of Stabilization of RNA Pseudoknots by Cobalt(III) Hexamine. *Biopolymers* **50**, 443-458.

45) Chen, X., Chu, M., & GIEDROC, D. P. (1999) MRE-Binding Transcription Factor-1: Weak Zinc-Binding Finger Domains 5 and 6 Modulate the Structure, Affinity and Specificity of the Metal-Response Element Complex. *Biochemistry* **38**, 12915-12925.

46) Chen, X., Chu, M., & GIEDROC, D. P. (2000) Spectroscopic Characterization of Co(II), Ni(II) and Cd(II)-substituted Wild-Type and Non-native Retroviral Zinc Finger Peptides. *J. Biol. Inorg. Chem.* **5**, 93-101.

47) Theimer, C. A. & GIEDROC, D. P. (2000) Contribution of the Intercalated Adenosine at the Helical Junction to the Stability of the gag-pro Frameshifting Pseudoknot from Mouse Mammary Tumor Virus. *RNA* **6**, 409-421.

48) Nixon, P. L., & GIEDROC, D. P. (2000) Energetics of a Strongly pH Dependent RNA Tertiary Structure in a Frameshifting Pseudoknot. *J. Mol. Biol.* **296**, 659-671.

49) GIEDROC, D. P., Theimer, C. A., & Nixon, P. L. (2000) Structure, Stability and Function of Pseudoknots Involved in Ribosomal Frameshifting. *J. Mol. Biol.* **298**, 167-185 (*invited review*).

50) Villemain, J. L., Ma, Y., GIEDROC, D. P., & Morrical, S. M. (2000) Mutations in the N-terminal Cooperativity Domain of Gene 32 Protein Alter Properties of the T4 Replication and Recombination Systems. *J. Biol. Chem.* **275**, 31496-31504.

51) VanZile, M. L., Cospers, N., Scott, R. A. & GIEDROC, D. P. (2000) The Zinc Metalloregulatory Protein, *Synechococcus* PCC7942 SmtB, Binds a Single Zinc Ion per Monomer with High Affinity in a Tetrahedral Coordination Geometry. *Biochemistry* **39**, 11818-11829.

52) GIEDROC, D. P., Chen, X., & Apuy, J. (2001) Metal-Response Element-Binding Transcription Factor-1 (MTF-1): Structure, Function and Regulation. *Antiox. Redox Signal.* **3**, 577-596 (*invited review*).

- 53) Busenlehner, L. S., Cospers, N. J., Scott, R. A., Rosen, B. P., Wong, M. D. & GIEDROC, D. P. (2001) Spectroscopic Properties of the Metalloregulatory Cd(II) and Pb(II) Sites of *S. aureus* pI258 CadC. *Biochemistry* **40**, 4426-4436.
- 54) GIEDROC, D. P., X. Chen, Pennella, M., & LiWang, A. (2001) Conformational Heterogeneity in the C-Terminal Zinc Fingers of Human MTF-1: An NMR and Zinc Binding Study. *J. Biol. Chem.* **276**, 42322-42332.
- 55) Apuy, J. L., Chen, X., Baldwin, T. O., Russell, D. H., & GIEDROC, D. P. (2001) Ratiometric Pulsed-Alkylation Mass Spectrometry of the Cysteine Pairs in Individual Zinc Fingers of MRE-Binding Transcription Factor-1 (MTF-1) as a Probe of Zinc Chelate Stability. *Biochemistry* **40**, 15164-15175.
- 56) Busenlehner, L. S., Apuy, J. L., & GIEDROC, D. P. (2002) Structural and Functional Characterization of a Metalloregulatory Bi(III) Site in *S. aureus* pI258 CadC. *J. Biol. Inorg. Chem.* **7**, 551-559.
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- 58) VanZile, M. L., Chen, X., & GIEDROC, D. P. (2002) Structural Characterization of Distinct  $\alpha_3N$  and  $\alpha_5$  Metal Sites in the Cyanobacterial Zinc Sensor SmtB. *Biochemistry* **41**, 9765-9775.
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- 63) Busenlehner, L. S., Pennella, M. A., & GIEDROC, D. P. (2003) The SmtB/ArsR Family of Metalloregulatory Transcriptional Repressors: Structural Insights into Prokaryotic Metal Resistance. *FEMS Microbiol. Rev.* **27**, 131-144 (invited review).

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- 66) Eicken, C., Pennella, M. A., Chen, X., Koshlap, K., VanZile, M. L., Sacchettini, J. C., & GIEDROC, D. P. (2003) A Metal-Ligand mediated Intersubunit Allosteric Switch in Related SmtB/ArsR Zinc Sensor Proteins. *J. Mol. Biol.* **333**, 683-695.
- 67) Chen, X., Zhang, B., Harmon, P. M., Schaffner, W., Peterson, D. O., & GIEDROC, D. P. (2004) A Novel Cysteine Cluster in Human MTF-1 is Required for Heavy Metal-induced Transcriptional Activation *in vivo*. *J. Biol. Chem.* **279**, 4515-4522.
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- 72) Liu, T., Golden, J. W., & GIEDROC, D. P. (2005) A Zn(II)/Pb(II)/Cd(II)-Inducible Operon from *Anabaena* is Regulated by AztR, an  $\alpha$ 3N ArsR/SmtB-family Metalloregulator. *Biochemistry* **44**, 8673-8683.
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- 92) Ma, Z., Cowart, D., Scott, R. A. & GIEDROC, D. P. (2009) Molecular insights into the metal selectivity of the Cu(I)-sensing repressor CsoR from *Bacillus subtilis*. *Biochemistry* **48**, 3325-3334.
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- 95) Ma, Z., Jacobsen, F. E., & GIEDROC, D. P. (2009) Coordination chemistry of bacterial metal transport and sensing. *Chem. Rev.* **109**, 4644-4681.
- 96) Arunkumar, A. I., Campanello, G. C. & GIEDROC, D. P. (2009) Solution structure of a paradigm ArsR family sensor in the DNA bound state. *Proc. Natl. Acad. Sci. U. S. A.* **106**, 18177-18182.
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- 101) Ma, Z., Cowart, D. M., Ward, B. P., Arnold, R. J., DiMarchi, R. D., Zhang, L., George, G. N., Scott, R. A., & GIEDROC, D. P. (2009) Unnatural amino acid substitution as a probe of the allosteric coupling pathway in a mycobacterial Cu(I) sensor. *J. Am. Chem. Soc.* **131**, 18044-18045.
- 102) Cao, S., GIEDROC, D. P., & Chen, S.-J. (2010) Predicting loop-helix tertiary structural contacts in RNA pseudoknots. *RNA* **16**, 538-552.
- 103) Wang, Y., Kendall, J., Cavet, J. S., & GIEDROC, D. P. (2010) Elucidation of the functional metal binding profile of a Cd(II)/Pb(II) sensor CmtR(Sc) from *Streptomyces coelicolor*. *Biochemistry* **49**, 6617-6626.
- 104) Reyes-Caballero, H., Guerra, A. J., Jacobsen, F. E., Kazmierczak, K. M., Cowart, D., Koppolu, U. M., Scott, R. A., Winkler, M. E., & GIEDROC, D. P. (2010) The metalloregulatory zinc site in *Streptococcus pneumoniae* AdcR, a zinc-activated MarR family repressor. *J. Mol. Biol.* **403**, 197-216.
- 105) Dragnea, V., Arunkumar, A. I., Lee, C. W., GIEDROC, D. P., & Bauer, C. E. (2010) A Q63E *Rhodobacter sphaeroides* AppA BLUF domain mutant is locked in a pseudo-light-excited signaling state. *Biochemistry* **49**, 10682-10690.
- 106) Sommer, F., Kropat, J., Malasarn, D., Grossoehme, N. E., Chen, X., GIEDROC, D. P., Merchant, S. S. (2010) The CRR1 Nutritional Copper Sensor in *Chlamydomonas* Contains Two Distinct Metal-Responsive Domains. *Plant Cell.* **22**, 4098-4113.
- 107) Jacobsen, F. E., Kazmierczak, K. M., Lisher, J. P., Winkler, M. E., & GIEDROC, D. P. (2011) Interplay between manganese and zinc homeostasis in the human pathogen *Streptococcus pneumoniae*. *Metallomics* **3**, 38-41.
- 108) Lee, C. W., Li, L., & GIEDROC, D. P. (2011) The solution structure of coronaviral stem-loop 2 (SL2) reveals a canonical CUYG tetraloop fold. *FEBS Lett.* **585**, 1049-1053
- 109) Grossoehme, N. E., Kehl-Fie, T. E., Ma, Z., Adams, K. W., Cowart, D. M., Scott, R. A., Skaar, E. P., & GIEDROC, D. P. (2011) Control of copper resistance and inorganic sulfur metabolism by paralogous regulators in *Staphylococcus aureus*. *J. Biol. Chem.* **286**, 13522-13531
- 110) Reyes-Caballero, H., Campanello, G. C., & GIEDROC, D. P. Metalloregulatory Proteins: Metal Selectivity and Allosteric Switching. *Biophys. Chem.*, in press (invited review)  
doi:10.1016/j.bpc.2011.03.010.

**OTHER REVIEWS, BOOK CHAPTERS AND PUBLISHED PROCEEDINGS (12):**

- 1) Villafranca, J.J., Colombo, G., Rajashekhar, B., GIEDROC, D., & Baldoni, J. (1982) Dopamine  $\beta$ -Hydroxylase: Studies of the  $\text{Cu}^{2+}$  Environment and Development of Suicide Inhibitors. In *Oxygenases and Oxygen Metabolism*, Academic Press, Inc., pp. 125-135.
- 2) GIEDROC, D.P., Keating, K.M., Martin, C.T., Williams, K.R., and Coleman, J.E. (1986) Zinc Metalloproteins Involved in Replication and Transcription. *J. Inorg. Biochem.* **28**, 155-169.
- 3) Keating, K.M., GIEDROC, D.P., Harris, L.D., Ghosaini, L.R., Williams, K.R., Sturtevant, J.M., & Coleman, J.E. (1987) The Contribution of Zinc to the Nucleic Acid Binding Properties of the Bacteriophage Gene 32 Protein. In *Protein Structure, Folding, and Design 2*, Alan R. Liss, Inc., New York, Vol. 67, pp. 35-44.
- 4) GIEDROC, D.P., & Coleman, J.E. (1988) Zinc Domains in Nonspecific Nucleic Acid Binding Proteins. *UCLA Symp. Mol. Cell. Biol., New Series* (Winge, D. & Hamer, D., eds.), Alan R. Liss, Inc., New York, Vol. 98, pp. 239-248.
- 5) Coleman, J.E., & GIEDROC, D.P. (1989) Zinc Proteins in Nucleic Acid Replication. In *Metal Ions in Biological Systems* (Sigel, H., ed.), Marcel Dekker, New York, Vol. 25, pp. 171-234.
- 6) GIEDROC, D.P. (1994) Zinc: DNA Binding Proteins. In the *Encyclopedia of Inorganic Chemistry* (King, R.B., ed.), John Wiley & Sons, Ltd., Sussex, England, pp. 4392-4406.
- 7) Pennella, M. A., Eicken, C., Busenlehner, L. S., Chen, X., VanZile, M. L., Sacchettini, J. C., and GIEDROC, D. P. (2003) Coordination Chemistry and Allosteric Switching in Bacterial Metal Sensor Proteins. In *Biomolecular Chemistry: A Bridge to the Future* (Baba, Y., ed.), Maruzen Co., Ltd., Tokyo, pp. 160-165.
- 8) Pennella, M. A. & GIEDROC, D.P. (2005) Zinc: DNA Binding Proteins. In the *Encyclopedia of Inorganic Chemistry, 2<sup>nd</sup> Ed.* (King, R.B., ed.), John Wiley & Sons, Ltd., Sussex, England. Vol. IX, pp. 5867-5885.
- 9) GIEDROC, D. P., and Grosseohme, N. E. (2009) Metal Ions and the Thermodynamics of RNA Folding, in *Metal Ion Interactions with Nucleic Acids* (Hud, N., ed.), Royal Society of Chemistry (RSC) Publishing, Cambridge, UK, pp. 180-220. (*Invited monograph*).
- 10) Miller, W. A. & GIEDROC, D. P. (2010) Ribosomal Frameshifting in Decoding Plant Viral RNAs, in *Recoding: Expansion in Decoding Rules Enriches Gene Expression* (Atkins, J. E., & Gesteland, R. F., eds). *Nucleic Acids and Molecular Biology* **24**, Springer, NY, pp. 192-220 (*Invited monograph*).
- 11) Grosseohme, N. E, & GIEDROC, D. P. (2011) Allosteric Coupling Between Transition Metal Binding Sites in Homooligomeric Metal Sensor Proteins in *Methods in Molecular Biology* series (Fenton, A., ed.), Human Press, Totowa, NJ, *in the press* (*Invited monograph*).
- 12) Grosseohme, N. E, & GIEDROC, D. P. (2011) Illuminating Allostery in Metal Sensing

Transcriptional Regulators, in *Methods in Molecular Biology* series (Bujalowski, W., ed.), Human Press, Totowa, NJ, *in the press (Invited monograph)*.

**MANUSCRIPTS SUBMITTED FOR PUBLICATION or IN PREPARATION (4):**

Stammler, S. N., Cao, S., Chen, S.-J. & GIEDROC, D. P. A conserved RNA pseudoknot in a proposed molecular switch domain of the 3' untranslated region of coronaviruses is only marginally stable. Manuscript in preparation.

Chang, F.-M., Lauber, M., Reilly, J. P., & GIEDROC, D. P. Ratiometric pulsed amidation as a probe of lysine reactivity in *B. subtilis* CsoR in different allosteric states. Manuscript in preparation.

Reyes-Caballero, H. & GIEDROC, D. P. Structural and physicochemical characterization of NmtR, the nickel/cobalt-specific ArsR family sensor from *M. tuberculosis*. Manuscript in preparation.

Guerra, A. J., & GIEDROC, D. P. Resonance assignments of the novel zinc sensor *Streptococcus pneumoniae* AdcR in the apo- and Zn(II)-bound states. Manuscript in preparation.

**Ph.D. (15) and M.S. (5) Degree Students Supervised:**

- 1994 Huawei Qiu, Ph.D., "The Role of Zinc Coordination in T4 Gene 32 Protein"
- 1994 Hsueh-O Chang, M.S., "RNA Binding Properties of Retroviral Nucleocapsid Proteins"
- 1995 Jana Villemain, Ph.D., "The Role of the N-terminal Domain of T4 Gene 32 Protein in the Cooperatively Bound Protein-Single-stranded Nucleic Acid Complex"
- 1995 Raza Khan, Ph.D., "Nucleic Acid Binding Studies of Recombinant HIV-1 Nucleocapsid Protein"
- 1996 Juqian Guo, M.S., "Structure and Stability of Co(II)-Complexes formed by Wild-type and Metal-Ligand Substitution Mutants of T4 Gene 32 Protein"
- 1999 Yun Gao, Ph.D., "Solution Structure, Backbone Dynamics, and RNA Binding Properties of Mason-Pfizer Monkey Virus Protein"
- 2000 Carla Theimer, Ph.D., "Structure-Stability Relationships in mRNA Pseudoknots Involved in Translational Control"
- 2001 Julius L. Apuy, Ph.D., "Ratiometric Pulsed Alkylation/Mass Spectrometry: Applications in the Studies of Protein Folding and Chelate Stability in Metalloproteins"
- 2002 Paul L. Nixon, Ph.D., "Structure and Stability Contributions of Noncanonical Base Pairs in mRNA Pseudoknots"
- 2002 Michael L. VanZile, Ph.D., "Characterization of the Metal and DNA Binding Properties of Cyanobacterial SmtB, a Novel Zn(II)-Metalloregulatory Protein"
- 2002 Saritha V. Suram, M.S., "Structure-Stability Correlation of an mRNA Pseudoknot"
- 2003 Laura S. Busenlehner, Ph.D., "Metal and DNA-Binding Properties of the Cadmium Sensor *S. aureus* pI258 CadC"
- 2004 Mario A. Pennella, Ph.D., "Metal Specificity and the Mechanism of Allosteric

- Regulation in Metal-Sensing Metal-Responsive Transcriptional Repressors *S. aureus* CzrA and *M. tuberculosis* NmtR”
- 2005 Yun Wang, M.S., "Characterization of *M. tuberculosis* CmtR<sup>Mtb</sup>, a Pb(II)/Cd(II)-Sensing SmtB/ArsR Metalloregulatory Repressor and a Homolog from *S. coelicolor* A3(2)"
- 2005 Peter V. Cornish, Ph.D., "Solution Structure and Functional Analysis of a Frameshift-Stimulating RNA Pseudoknot from Sugarcane Yellow Leaf Virus"
- 2007 Lichun Li, Ph.D., "Insights into Subgenomic RNA Synthesis in Coronaviruses from Structural and Biophysical Studies"
- 2008 Suzanne Stammler, Ph.D., "Structural Studies of a Proposed Conformational Switch in the 3' Untranslated Region (UTR) of Mouse Hepatitis Virus (MHV)"
- 2009 Zhen Ma, Ph.D., "Physicochemical Characterization of the Bacterial Cu(I)-sensing Repressor CsoR"
- 2009 Jay Pilrose, M.S., Indiana University, "Orientation of the Mouse Hepatitis Virus (MHV) Transcription Regulatory Sequence (TRS) in the Nucleocapsid Protein RNA Binding Cleft"
- 2011 Hermes Reyes-Caballero, Ph.D., Texas A&M University, "Biochemical and spectroscopic properties of the nickel sensor *Mycobacterium tuberculosis* NmtR and the zinc sensor *Streptococcus pneumoniae* AdcR"

### **Undergraduate Research Students Supervised:**

#### **Texas A&M University:**

- 1989 Courtney Robertson
- 1990 Keith Barnhart
- 1990 Sharon Syers
- 1991 Brian Bruner
- 1993 Amy Middlestead
- 1994 Brett Thompson
- 1995 Merideth Esterline
- 1995-96 Paul Nixon, Jennifer Roberts, Ponnareth Pok (HHMI Fellow); Rudy Martinez (HHMI Fellow)
- 1997-98 Lindsay Windham (Undergraduate Honors Fellow; 1998 Pfizer Summer Undergraduate Research Fellow); Imelda Hau (1998 ONR Summer Intern)
- 1997-01 Brian Cannon (HHMI Fellow; Undergraduate Honors Fellow)
- 1998-99 Travis Young
- 1998-00 Endah Sulistijo (Undergraduate Honors Fellow)
- 1999-00 Ryan Loyd; Patricia Gordon (2000 ONR Summer Intern)
- 2000-01 Bessie Mannankara
- 2000-01 Deepa Thomas
- 2003 Annie Arguello (2003 ONR Summer Intern, St. Mary's University); Imran Khan
- 2003 Bryan Tackett
- 2004 Kathryn Bispeck
- 2004-06 Justin Chen, Joseph Kopfler
- 2006-07 Michelle Gaona

#### **Indiana University:**

D. P. Giedroc: Curriculum Vitae (May 2011)

2007-09 Mary Ellen Finnegan  
2008-10 Kate Gifford  
2080-11 Katie Geiger  
2010-on Christopher Short  
2011-on Ross Brenner, Logan Norrell

**High School Minority Student Research Apprenticeship Students Supervised:**

1990 Katherine Chen  
1991 Jesse (YuPo) Chang  
1992 Kevin Jackson

**Current Research Group (10):**

Assistant Scientist (1): Dr. Chul Won Lee

Ph.D. Students (9): Alfredo Guerra (C4), Greg Campanello (C4), Sarah Keane (C4), Benjamin Kester (B3), Feng-Ming Chang (C3), Justin Luebke (C2), Yue Fu (B2), John Lisher (B2), Mengmeng Tang (B2) (C=Chemistry Ph.D.; B=Biochemistry Ph.D. student; year)

Undergraduate Students (4):, Katie Geiger, Christopher Short, Ross Brenner, Logan Norrell

**TEACHING ACTIVITIES:**

**TEXAS A&M UNIVERSITY:**

**BICH 107**, Freshman survey course of biochemical research (1 guest lecture)  
Fall 1989, Fall 1990, Fall 1992, Fall 1996, Fall 1997, Fall 2006

**BICH 681** (1 credit), Student seminar course

Fall 1989, Spring 1990, Fall 1990, Spring 1991, Fall 1994, Fall 1995

**BICH 689** (1 credit), Special Topics, Spectroscopy of Biological Macromolecules. Devoted to theory and practice of spectroscopy of proteins and nucleic acids. Covered absorption, fluorescence (steady-state and lifetime), circular dichroism, and NMR (to basic 2D NMR) spectroscopies. This material was largely incorporated into a revised BICH 624  
Spring 1990

**BICH 624** (3), Proteins, Enzymes and Nucleic Acids (*see below*)

Spring 1991, Spring 1993, Spring 1994, Spring 1995, Spring 1996, Spring 1997

**BICH 440** (3), Comprehensive Biochemistry I, Honors section. Text, Voet & Voet's *Biochemistry*.

First course of two-semester sequence in general biochemistry for honors-level (GPA 3.25 or above) juniors and seniors in Biochemistry and related majors.

Fall 1991 (course shared with one other instructor)

**BICH 603** (3), Physical Biochemistry. Survey course for first year graduate students in Biochemistry and interested Chemistry students.

Fall 1992, 1994 (course shared with two other instructors)

**BICH 407** (1), Metals in Biological Systems. Advanced undergraduate course taught from the current literature focusing on the structure, function and mechanism of metal-regulated switches which operate at the transcriptional level of gene expression; Metal homeostasis and human disease.

Spring 1997, Spring 2006

**BICH 410** (3), Comprehensive Biochemistry I, Text, Lehninger, *Principles of Biochemistry* or Mathews & van Holde, *Biochemistry*. First course of two-semester sequence in general biochemistry for juniors and seniors.

Fall 1997, 1998

**BICH 609** (2), Development of an Original Research Proposal.

Spring 1998, 1999, 2000, 2001

**BICH 605** (3), Biochemical Methods. This course covers often-used methods of biochemical analysis, including protein purification, physical methods, recombinant DNA methodologies, and DNA arrays with an emphasis on the understanding, implementation and rationale behind the methods.

Fall 1999, 2000

**BICH 608** (2), Critical Analysis of the Biochemical Literature (shared with one other instructor)

Fall 2002, 2003

**BIPH 655** (4), Molecular Biophysics: Macromolecular Interactions. Core graduate course in the Molecular Biophysics Training Program.

Spring 2003, Spring 2004, Fall 2004, Fall 2005, Fall 2006

#### **Courses Developed:**

**BICH 624 (3) Proteins, Enzymes and Nucleic Acids.** Since 4-5 years had elapsed since BICH 624 was offered, I completely revamped the course in Spring 1991 in order to incorporate new findings. Particular emphasis has been placed on structure and stability of proteins and nucleic acids (DNA, unusual RNAs), coupled with a complete course on various spectroscopies relevant to the study of biomolecules, followed by thermodynamics of protein-nucleic acid interactions, the latter developed from fundamental binding and linkage relationships. Texts included Cantor & Schimmel's *Biophysical Chemistry* and Wyman and Gill's *Binding and Linkage*. Since no single text proved satisfactory, most of the material for class discussion was taken directly from the primary literature (papers published within the last 3 or so years). Emphasis has been placed on problem solving with the use of computers to generate theoretical isotherms, etc., and implementation of nonlinear least squares fitting algorithms in data analysis. In Spring 1994 BICH 624 became a core required course for our graduate students.

**BICH 407 (1) Metals in Biological Systems.** A literature survey course designed for advanced undergraduate students. The course covered the coordination chemistry and mechanisms of gene regulatory systems which mediate the response of cells to a variety of heavy metal stimuli. A companion text available for purchase by students was *Principles of Bioinorganic Chemistry* by S. Lippard and J. Berg.

**BIPH 655 (formerly BICH 689) (3) Molecular Biophysics: Macromolecular**

**Interactions.** The objective of this course is to investigate the subject of macromolecular interactions, *i.e.*, binding, from a perspective strongly rooted in statistical thermodynamics and probabilities. The student gains an understanding of the rates and equilibria of macromolecular interactions involving proteins, nucleic acids (DNA and RNA), and biological membranes, with a special emphasize the quantitative analysis and evaluation of different binding models, rather than the details of the biochemical or spectroscopic methods commonly used to investigate binding equilibria and kinetics. Optional Texts: *Thermodynamic Theory of Site-Specific Binding Processes in Biological Macromolecules* by E. DiCera; *Molecular Driving Forces: Statistical Thermodynamics in Chemistry and Biology* by Dill and Bromberg; *Kinetics for the Life Sciences* by Gutfreund.

**INDIANA UNIVERSITY:**

**B600/B800** (1 credit), Seminar in Biochemistry. A graduate student-led literature survey course of recent research published in thigh-profile journals, loosely affiliated with invited speakers of the IU Biochemistry seminar series.

Spring 2008; Fall 2008; Spring 2010

**B603/C685** (1.5 credits), Macromolecular Structure and Interactions. A graduate-level course that is loosely based on BIPH 655 (see above), but with a greater emphasis on statistical thermodynamics, macromolecular dynamics over a wide range of timescales, and single-molecule methods.

Spring 2008; Spring 2010

**B501** (4.5 credits; shared with two other instructors). First semester graduate core course in biochemistry for Biochemistry, Biology and Chemistry majors.

Fall 2008, Fall 2009

**B680** (1.5 credits), Special Topics in Biomolecular NMR Spectroscopy. Advanced graduate course devoted to understanding the theory, logic and challenges of modern NMR spectroscopy of proteins, protein assemblies and large RNAs.

Spring 2009

**SERVICE AND ADMINISTRATION:**

**Intramural:**

**TEXAS A&M UNIVERSITY:**

1989 to 1995	Member, Graduate Program Committee (GPC)
1990 to 1991	Member, Junior Faculty Search Committee
1991 to 1992	Chair, Oligonucleotide Synthesis Advisory Committee (OSAC)
1992 to 1993	Member, X-Ray Crystallographer Welch Chair Search Committee
1992 to 1999	Member, Advanced DNA Technology Laboratory Faculty Advisory Committee
1994 to 1995	Member, X-Ray Crystallographer Welch Chair Search Committee
1994 to 1995	Member, Computer Use Committee

1994 to 1995	Member, Junior Faculty Search Committee
1995 to 1998	Secretary, TAMU Section of the American Chemical Society
1995 to 1998	Chair, Computer Use Committee
1996 to 1998	Member, Executive Committee of the Department
1997 to 1999	Chair, Facilities Committee
1997 to 1998	Chair, Junior Faculty Search Committee (resulted in 3 hires made)
1998 to 2007	Member, Graduate Recruiting and Admissions Committee
1999 to 2007	Faculty Director, Laboratory for Biomolecular NMR Spectroscopy
1999 to 2007	Director, Center for Advanced Biomolecular Research
1999 to 2000	Member, Head of Department Search Committee
1999 to 2001	Member, College of Agriculture and Life Sciences Promotion and Tenure Committee
2000 to 2006	Member, Departmental Promotion and Tenure Committee (Chair, 2002-2005)
2001 to 2003	Member, TAMUS Life Sciences Task Force
2002 to 2007	Member, Executive Committee, NIH Molecular Biophysics Training Program; Director-elect (January 2005)
2002 to 2004	Member, Departmental Executive Committee
2003 to 2006	Member or Chair, Structural Biology Faculty Search Committee

**INDIANA UNIVERSITY:**

2007 to 2008	Member, Faculty Search Committee, Biological Chemistry (Department of Chemistry)
2007 to 2008	Member, Junior Faculty Search Committee, Virology (Department of Biology)
2007 to 2008	Member, Senior Faculty Search Committee, Cancer Biology
2007 to 2008	Member, Director Search Committee, Indiana Cultivation and Bioprocessing Facility
2007 to 2008	Member, Graduate Admissions Committee (biological division), Department of Chemistry
2007 to 2008	Member, Faculty Information Gathering Committee, Professors Tolbert and Zhang
2008 to 2011	Member, Policy Committee, Department of Chemistry
2008 to 2009	Member, Faculty Search Committee, Program in Biochemistry
2010 to present	Organizing Director, Graduate Training Program in Quantitative and Chemical Biology (QCB)
2010 to 2014	Chair, Department of Chemistry

**Extramural:**

1995	Member, <i>Ad hoc</i> Site-Visit Review Committee, SAIC Laboratory of Cell and Molecular Structure and SAIC AIDS Vaccine Development Program, Frederick Cancer Research and Development Center, NCI, Frederick, MD
1999	<i>Ad hoc</i> full member, Molecular and Cellular Biophysics (BBCA) Study Section, NIH
2000	<i>Ad hoc</i> reviewer, Division of Chemistry, National Science Foundation
2001 to 2006	Full member, Cancer Drug Development Peer Review Committee,

	American Cancer Society (met twice per year)
2001	<i>Ad hoc</i> Full Member, Special Emphasis Panel SSS-B SS, NIH
2001	<i>Ad hoc</i> Full Member, SSS-A(1) SS, NIH
2002	<i>Ad hoc</i> Full Member, ZRG1 BBCB SS, NIH
2003	<i>Ad hoc</i> Full Member, ZRG1 SSS-B SS, NIH
2003	<i>Ad hoc</i> Full Member, BBCA SS, NIH
2004	Member, Program Committee, 2005 Biophysical Society Annual Meeting
2004	<i>Ad hoc</i> Full Member, ZRG1 SS, NIH
2004	<i>Ad hoc</i> Full Member, BMT SS, NIH
2005	Mail reviewer, ZRG1 BCMB-Q SS, NIH
2006-2010	Full Member, BRT-B (Biomedical Research Training) SS, NIH
2011	Full reviewer, Program Project Grant, NIH

### **EDITORIAL AND REVIEWING ACTIVITIES:**

1997 to 2001          Member, Editorial Board, *Journal of Biological Chemistry*

Regular reviewer, *Biochemistry*, *Journal of Molecular Biology*, *Journal of the American Chemical Society*  
*Journal of Biological Chemistry*

*Ad hoc* reviewer, *Proceedings of the National Academy of Sciences USA*, *Biophysical Journal*, *Nucleic Acids Research*, *Molecular and Cell Biology*, *Journal of Inorganic Biochemistry*, *Journal of Biological Inorganic Chemistry*, *Chemical Communications*, *Molecular Microbiology*, *RNA*, *Analytical Biochemistry*, *Nature Reviews Microbiology*, *Nature Chemical Biology*