

CURRICULUM VITAE

JOHN A. GERLT

Personal

Date of Birth: July 28, 1947
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Education

B.S. (1969) Michigan State University
A.M. (1970) Harvard University
Ph.D. (1974) Harvard University

Positions Held

Jane Coffin Childs Memorial Fund Fellow, NIH, 1974-75
Assistant Professor of Chemistry, Yale University, 1975-81
Associate Professor of Chemistry, Yale University, 1981-84
Professor of Chemistry and Biochemistry, University of Maryland, 1984-1994
Professor of Biochemistry, University of Illinois, Urbana-Champaign, 1994-present
Professor of Chemistry, University of Illinois, Urbana-Champaign, 1994-present
Head of Biochemistry, University of Illinois, Urbana-Champaign, 1994-2004
Gutgsell Chair, University of Illinois, 2004-present

Awards and Honors

Jane Coffin Childs Memorial Fund Fellowship, 1974-75
NIH Research Career Development Award, 1978-83
Alfred P. Sloan Foundation Fellowship, 1981-85
Arthur C. Cope Travel Award, American Chemical Society, 1982
Co-Chair, Gordon Research Conference on Enzymes, Coenzymes, and
Metabolic Pathways, 1984
Member, Physical Biochemistry Study Section, NIH, 1986-90
Sigma Xi Award for Contribution to Science, University of Maryland
Chapter, 1989
University of Maryland College Park, Distinguished Faculty Research Fellowship,
1990-91
Repligen Corporation Award in Chemistry of Biological Processes, 2003
Fellow, American Association for the Advancement of Science (AAAS), 2007

Advisory Panel, Schwerpunkt on Directed Evolution, Deutsche Forschung Gemeinschaft, 2004-2009

Arthur C. Cope Scholar Award, American Chemical Society, 2010

A. I. Scott Medal, Department of Chemistry, Texas A&M University, 2010

Associate Editor, *Biochemistry*, 2004-present

Research Support

Structural Bases for Catalytic Efficiency and Substrate Specificity. NIH R01 GM065155, 2/1/03 – 8/30/12. Includes contracts to the Albert Einstein College of Medicine (S. Almo) and University of California, San Francisco (M.P. Jacobson). Current year: total costs (including subcontract), \$350,000; Illinois direct costs, \$170,000.

Deciphering Enzyme Specificity. NIH P01 GM071790, 7/10/04 – 6/30/14. Includes subcontracts to Texas A&M University (F. Raushel), University of California, San Francisco (P. Babbitt, A. Sali, B. Shoichet, and M. Jacobson) and Albert Einstein College of Medicine (S. Almo). Current year (7/10/09-6/30/10): total costs (including subcontracts), \$1,540,710; Illinois direct costs, \$240,000.

Planning Grant for Collaborative Project for an Enzyme Function Initiative, NIH 1R24 GM087999-01, 4/10/09 – 3/30/11. Direct costs, \$50,000.

A Collaborative Center for an Enzyme Function Initiative. NIH U54 GM093342, 5/01/10 – 4/30/15/ A Glue Grant that includes J. A. Gerlt (PI) and thirteen CoPIs: Steven Almo (Albert Einstein College of Medicine), Karen Allen (Boston University), Richard Armstrong (Vanderbilt University Medical Center), Patricia Babbitt (UCSF), John Cronan (UIUC), Debra Dunaway-Mariano (University of New Mexico), Matthew Jacobson (UCSF), Wladek Minor (University of Virginia), C. Dale Poulter (University of Utah), Frank Raushel (Texas A&M University), Andrej Sali (UCSF), Brian Shoichet (UCSF), and Jonathan V. Sweedler (UIUC). Current year (5/01/10-4/30/11): total costs (including subcontracts), \$4,500,000; Illinois direct costs, \$1,100,000 (including Administrative Core, Microbiology Core, and Enolase Superfamily Bridging Project).

Biochemistry, Structure, and Engineering of Enzymes to Overcome Biomass Recalcitrance, Energy Biosciences Institute, 1/1/08-12/31/12. Current year: Direct costs, \$500,000. This project includes John E. Cronan and Satish K. Nair, CoPIs.

Publications

The Mechanism of Action of 5'-Adenylic Acid-Activated Threonine Dehydrase. IV. Characterization of the Kinetic Effect of Adenosine Monophosphate. C. P. Dunne, J. A. GERLT, K. W. Rabinowitz, and W. A. Wood, *J. Biol.Chem.* **1973**, *248*, 8189.

The Mechanism of Action of 5'-Adenylic Acid Activated Threonine Dehydrase. V. Relation between Ligand-Induced Allosteric Activation and the Protomer-Oligomer Interconversion, J. A. GERLT, K. W. Rabinowitz, C. P. Dunne, and W. A. Wood, *J. Biol. Chem.* **1973**, *248*, 8200.

A Phosphohydrolase from *Enterobacter aerogenes*, J. A. GERLT and F. H. Westheimer, *J. Am. Chem. Soc.* **1973**, *95*, 8166.

Enthalpy of Hydrolysis of Simple Phosphate Esters, J. M. Sturtevant, J. A. GERLT, and F. H. Westheimer, *J. Am. Chem. Soc.* **1973**, *95*, 8168.

Regulation of L-Threonine Dehydrase by Ligand-Induced Oligomerization, C. P. Dunne, R. C. Menson, J. A. GERLT, and W. A. Wood, in "Metabolic Interconversion of Enzymes," E. H. Fischer *et al.* (Eds.), Springer-Verlag, New York, **1974**, pp. 349.

Purification and Properties of a Phosphohydrolase from *Enterobacter aerogenes*, J. A. GERLT and G. J. R. Whitman, *J. Biol. Chem.* **1975**, *250*, 5053.

The Enthalpies of Hydrolysis of Acyclic, Monocyclic, and Glycoside Cyclic Phosphate Diesters, J. A. GERLT, F. H. Westheimer, and J. M. Sturtevant, *J. Biol. Chem.* **1975**, *250*, 5059.

Stereochemistry of the Hydrolysis of the Endo Isomer of Uridine 2',3'-Cyclic Phosphorothioate Catalyzed by the Nonspecific Phosphohydrolase from *Enterobacter aerogenes*, J. A. GERLT and W. H. Y. Wan, *Biochemistry* **1979**, *18*, 4630.

Thermochemical Identification of the Structural Factors Responsible for the Thermodynamic Instability of 3',5'-Cyclic Nucleotides, J. A. GERLT, N. I. Gutterson, P. Datta, B. Belleau, and C. L. Penney, *J. Am. Chem. Soc.* **1980**, *102*, 1655.

Theoretical Calculations on the Geometric Destabilization of 3',5'- and 2',3'-Cyclic Nucleotides, F. J. Marsh, P. Weiner, J. E. Douglas, P. A. Kollman, G. L. Kenyon, and J. A. GERLT, *J. Am. Chem. Soc.* **1980**, *102*, 1660.

Conformational Properties of Substituted Trimethylene Phosphates in Solution, J. A. GERLT, N. I. Gutterson, R. E. Drews, and J. A. Sokolow, *J. Am. Chem. Soc.* **1980**, *102*, 1665.

Crystal and Molecular Structure of 5-Ethoxy Trimethylene Phosphoric Acid, J. A. GERLT, D. F. Chodosh, R. E. Drews, and R. D. Adams, *J. Org. Chem.* **1980**, *45*, 1282.

Mechanism of the Adenylate Cyclase Reaction. Stereochemistry of the Reaction Catalyzed by the Enzyme from *Brevibacterium liquefaciens*, J. A. GERLT, J. A. Coderre, and M. S. Wolin, *J. Biol. Chem.* **1980**, *255*, 331.

Oxygen Chiral Phosphodiester. 1. Synthesis and Configurational Analysis of Cyclic [¹⁸O]-2'-Deoxyadenosine 3',5'-Monophosphate, J. A. GERLT and J. A. Coderre, *J. Am. Chem. Soc.* **1980**, *102*, 4531.

Syntheses and Configurational Assignments of the Diastereomers of the 4-Nitrophenyl Esters of Thymidine 3'-(N-Phenyl Phosphoramidate) and Thymidine 5'-(N-Phenyl Phosphoramidate), J. A. GERLT, S. Mehdi, J. A. Coderre, and W. O. Rogers, *Tet. Letters* **1980**, 21, 2385.

Oxygen Chiral Phosphodiester. 2. Enzymatic Synthesis and Configurational Analysis of [^{18}O]-2'-Deoxyadenosine 5'-Diphosphate, J. A. Coderre and J. A. GERLT, *J. Am. Chem. Soc.* **1980**, 102, 6594.

The Solution Conformational Preferences of the Sugar and Sugar Phosphate Constituents of RNA and DNA, J. A. GERLT and A. V. Youngblood, *J. Am. Chem. Soc.* **1980**, 102, 7433.

Oxygen Chiral Phosphodiester. 3. Use of ^{17}O NMR to Demonstrate Configurational Differences in the Diastereomers of Cyclic [$^{17}\text{O},^{18}\text{O}$]-2'-Deoxyadenosine 3',5'-Monophosphate, J. A. Coderre, S. Mehdi, P. C. Demou, R. Weber, D. D. Traficante, and J. A. GERLT, *J. Am. Chem. Soc.* **1981**, 103, 1870.

Oxygen Chiral Phosphodiester. 4. Stereochemical Course of the Hydrolysis of Cyclic [$^{17}\text{O},^{18}\text{O}$]-2'-Deoxyadenosine 3',5'-Monophosphate in H_2^{16}O Catalyzed by Bovine Heart Cyclic Nucleotide Phosphodiesterase, J. A. Coderre, S. Mehdi, and J. A. GERLT, *J. Am. Chem. Soc.* **1981**, 103, 1872.

Oxygen Chiral Phosphodiester. 5. Stereochemical Course of the Hydrolysis of Thymidine 3'-(4-Nitrophenyl [$^{17}\text{O},^{18}\text{O}$]Phosphate) in H_2^{16}O Catalyzed by the Exonuclease from Bovine Spleen, S. Mehdi and J. A. GERLT, *J. Am. Chem. Soc.* **1981**, 103, 7018.

Stereochemical Course of the Hydrolysis of Thymidine 5'-(4-Nitrophenyl [$^{17}\text{O},^{18}\text{O}$]Phosphate) in H_2^{16}O Catalyzed by the Phosphodiesterase from Snake Venom, S. Mehdi and J. A. GERLT, *J. Biol. Chem.* **1981**, 256, 12164.

High Field ^{17}O NMR Studies of Adenine Nucleotides, J. A. GERLT, P. C. Demou and S. Mehdi, *Nucleic Acids Research Symposium Series No. 9* **1981**, 11.

Syntheses and Configurational Assignments of Thymidine 3'- and 5'-(4-Nitrophenyl [$^{17}\text{O},^{18}\text{O}$]Phosphates), S. Mehdi, J. A. Coderre, and J. A. GERLT, *ACS Symposium Series* **1981**, 171, 109.

^{17}O NMR Spectral Properties of Simple Phosphate Esters and Adenine Nucleotides, J. A. GERLT, P. C. Demou, and S. Mehdi, *J. Am. Chem. Soc.* **1982**, 104, 2848.

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^{17}O NMR Spectral Properties of Pyrophosphate, Simple Phosphonates, and Thiophosphate and Phosphonate Analogs of ATP, J. A. GERLT, M. A. Reynolds, P. C. Demou, and G. L. Kenyon, *J. Am. Chem. Soc.* **1983**, 105, 6469.

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A General Method for the Chemical Shift Assignments of ^{31}P Nuclei in Nucleic Acids, M. Petersheim, S. Mehdi, and J. A. GERLT, *J. Am. Chem. Soc.* **1984**, *106*, 439.

Syntheses and Configurational Analyses of Thymidine 4-Nitrophenyl [^{17}O , ^{18}O]Phosphates and the Stereochemical Course of a Reaction Catalyzed by Bovine Pancreatic Deoxyribonuclease I, S. Mehdi and J. A. GERLT, *Biochemistry* **1984**, *23*, 4844.

Use of Chiral [^{16}O , ^{17}O , ^{18}O]Phosphate Esters to Determine the Stereochemical Course of Enzymatic Phosphoryl Transfer Reactions, J. A. GERLT, in "Phosphorus-31 NMR Spectroscopy: Principles and Applications," D. G. Gorenstein, Ed., Academic Press, New York, **1984**, pp. 199-232.

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Site-Directed Mutants of Staphylococcal Nuclease. Detection and Localization by ^1H NMR Spectroscopy of Conformational Changes Accompanying Substitutions for Glu 43, D. W. Hibler, N. J. Stolowich, M. A. Reynolds, J. A. GERLT, J. A. Wilde, and P. H. Bolton, *Biochemistry* **1987**, *26*, 6278.

Coexistence of Conformations in a DNA Heteroduplex Revealed by Site Specific Labeling with ^{13}C Labeled Nucleotides, M. Manoharan, J. A. GERLT, J. A. Wilde, J. M. Withka, and P. H. Bolton, *J. Am. Chem. Soc.* **1987**, *109*, 7217.

Relationships between Enzymatic Catalysis and Active Site Structure Revealed by Applications of Site-Directed Mutagenesis, J. A. GERLT, *Chem. Rev.* **1987**, *87*, 1079.

Cloning, DNA Sequence, and Expression in *Escherichia coli* of the Gene for Mandelate Racemase from *Pseudomonas putida*, S. C. Ransom, J. A. GERLT, V. Powers, and G. L. Kenyon, *Biochemistry* **1988**, *27*, 540.

Synthesis of Abasic Sites in DNA Heteroduplexes and their Characterization by Site Specific Labeling with ^{13}C , M. Manoharan, A. Mazumder, S. C. Ransom, J. A. GERLT, J. A. Wilde, and P. H. Bolton, *J. Am. Chem. Soc.* **1988**, *110*, 1620.

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Identification of Residues Involved in a Conformational Change Accompanying Substitutions for Glutamate 43 in Staphylococcal Nuclease, J. A. Wilde, P. H. Bolton, M. Dell'Acqua, T. Pourmotabbed, D. W. Hibler, and J. A. GERLT, *Biochemistry* **1988**, *27*, 4127.

Preliminary X-Ray Data on Crystals of Mandelate Racemase, D. J. Neidhardt, V. M. Powers, G. L. Kenyon, A. Y. Tsou, S. C. Ransom, J. A. GERLT, and G. A. Petsko, *J. Biol. Chem.* **1988**, *263*, 9268.

Isolation and Characterization of a Small Catalytic Domain Released from the Adenylate Cyclase from *Escherichia coli* by Digestion with Trypsin, M. M. Holland, T. K. Leib, and J. A. GERLT, *J. Biol. Chem.* **1988**, *263*, 14661.

Direct Observation of Multiple Environments for the H_α but not the H_β Proton of a Histidine Residue in Staphylococcal Nuclease, S. M. Stanczyk, P. H. Bolton, M. Dell'Acqua, T. Pourmotabbed, and J. A. GERLT, *J. Am. Chem. Soc.* **1988**, *110*, 7908.

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Selection and Characterization of a Mutant of the Cloned Gene for Mandelate Racemase that Confers Resistance to an Affinity Label by Greatly Enhanced Production of Enzyme, A. Y. Tsou, S. C. Ransom, J. A. GERLT, V. M. Powers, and G. L. Kenyon, *Biochemistry* **1989**, *28*, 969.

Kinetic and Magnetic Resonance Studies of the Glutamate 43 to Serine Mutant of Staphylococcal Nuclease, E. H. Serspersu, D. W. Hibler, J. A. GERLT, and A. S. Mildvan, *Biochemistry* **1989**, *28*, 1539.

Characterization of the Equilibrating Forms of the Aldehydic Abasic Site in Duplex DNA by ^{17}O NMR, J. A. Wilde, P. H. Bolton, A. Mazumder, M. Manoharan, and J. A. GERLT, *J. Am. Chem. Soc.* **1989**, *111*, 1894.

Site Specific ^{13}C Labeling of DNA to Deduce DNA Repair Mechanisms of Uracil-DNA Glycosylase and UV Endonuclease V, M. Manoharan, S. C. Ransom, A. Mazumder, and J. A. GERLT, *Nucleosides & Nucleotides* **1989**, *8*, 879.

UV Endonuclease V from Bacteriophage T₄ Catalyzes DNA Strand Cleavage at Aldehydic Abasic Sites by a Syn α -Elimination Mechanism, A. Mazumder, J. A. GERLT, L. Rabow, M. J. Absalon, J. Stubbe, and P. H. Bolton, *J. Am. Chem. Soc.* **1989**, *111*, 8029.

Detection and Sequence Assignment of a Cis Prolyl Peptide Bond in Unliganded Staphylococcal Nuclease, S. M. Stanczyk, P. H. Bolton, M. Dell'Acqua, and J. A. GERLT, *J. Am. Chem. Soc.* **1989**, *111*, 8317.

The Use of Isotopic Labeling with ^2H and ^{13}C to Compare the Conformations of Proteins and Mutants Generated by Site-Directed Mutagenesis I., D. W. Hibler, L. Harpold, T. Pourmotabbed, M. Dell'Acqua, J. A. GERLT, J. A. Wilde, and P. H. Bolton, *Methods Enzymol.* **1989**, *177B*, 74.

The Use of Isotopic Labeling with ^2H and ^{13}C to Compare the Conformations of Proteins and Mutants Generated by Site-Directed Mutagenesis II., J. A. Wilde, P. H. Bolton, D. W. Hibler, L. Harpold, T. Pourmotabbed, M. Dell'Acqua, and J. A. GERLT, *Methods Enzymol.* **1989**, *177B*, 282.

Kinetic and Conformational Effects of Lysine Substitutions for Arginines 35 and 87 in the Active Site of Staphylococcal Nuclease, T. Pourmotabbed, M. Dell'Acqua, J. A. GERLT, S. M. Stanczyk, and P. H. Bolton, *Biochemistry* **1990**, *29*, 3677.

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Stereochemical Studies of the α -Elimination Reactions at Aldehydic Sites in DNA: Endonuclease III from *Escherichia coli*, Sodium Hydroxide, and Lys-Trp-Lys, A. Mazumder, J. A. GERLT, M. J. Absalon, J. Stubbe, R. P. Cunningham, J. M. Withka, and P. H. Bolton, *Biochemistry* **1991**, *30*, 1119.

Deletion of the Omega Loop in the Active Site of Staphylococcal Nuclease. I. Effects on Catalysis and Stability, L. B. Poole, D. A. Loveys, S. P. Hale, J. A. GERLT, S. M. Stanczyk, and P. H. Bolton, *Biochemistry* **1991**, *30*, 3621.

Deletion of the Omega Loop in the Active Site of Staphylococcal Nuclease. II. Effects on Protein Structure and Dynamics, D. M. Baldissari, D. A. Torchia, L. B. Poole, and J. A. GERLT, *Biochemistry* **1991**, *30*, 3628.

Mechanism of the Reaction Catalyzed by Mandelate Racemase. I. Chemical and Kinetic Evidence for a Two-Base Mechanism, V. M. Powers, C. W. Koo, G. L. Kenyon, J. A. GERLT, and J. W. Kozarich, *Biochemistry* **1991**, *30*, 9255.

Mechanism of the Reaction Catalyzed by Mandelate Racemase. II. Crystal Structure of Mandelate Racemase at 2.5 Å, D. J. Neidhart, P. L. Howell, G. A. Petsko, V. M. Powers, R. Li, G. L. Kenyon, and J. A. GERLT, *Biochemistry* **1991**, *30*, 9264.

Mechanism of the Reaction Catalyzed by Mandelate Racemase. III. Asymmetry in Reactions Catalyzed by the H297N Mutant, J. A. Landro, A. Kallarakal, S. C. Ransom, J. A. GERLT, J. W. Kozarich, D. J. Neidhart, and G. L. Kenyon, *Biochemistry* **1991**, *30*, 9274.

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Understanding Enzyme-Catalyzed Proton Abstraction from Carbon Acids: Details of Stepwise Mechanisms for α -Elimination Reactions, J. A. GERLT and P. G. Gassman, *J. Am. Chem. Soc.* **1992**, 114, 5928.

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