

CURRICULUM VITAE
JAMES M. MANNING

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A. EDUCATION

1956-1960 Boston College, Chestnut Hill, Massachusetts, B.S. Chemistry, Honors
1960-1966 Tufts University, Medford, Massachusetts, Ph.D. Biochemistry

B. APPOINTMENTS

1996-Present Professor of Biochemistry, Northeastern University.
1996-Present Adjunct Professor, The Rockefeller University.
1977-1995 The Rockefeller University, Associate Professor of Biochemistry (tenured);
1988-1995, Head of Laboratory (Biochemistry).
1975-1995 Cornell University Medical College, Adjunct Associate Professor of
Biochemistry.
1972-1977 The Rockefeller University, Associate Professor of Biochemistry (untenured).
1969-1972 The Rockefeller University, Assistant Professor of Biochemistry.
1967-1969 The Rockefeller University, Research Associate.
1966-1967 University of Rome, Italy, National Science Foundation Postdoctoral Fellow.
1960-1966 Tufts University, USPHS Pre-doctoral Fellow.

C. PROFESSIONAL SOCIETIES AND ACTIVITIES

American Society of Biological Chemists
American Chemical Society
The Harvey Society
American Society of Hematology
Protein Society

D. PROFESSIONAL ACTIVITIES AND AWARDS

1976-1978 American Heart Association, Grants Review Committee
1977-1979 American Society of Biological Chemists, Membership Committee,
Chairman (1979)
1977-1979 National Science Foundation, Postdoctoral Fellowship Evaluation Panel,
Chairman (1979)
1975-1986 The New England Enzyme Center, Scientific Advisory Committee
1973-Present National Institutes of Health ad hoc Study Sections

1979-1984	Journal of Biological Chemistry, Editorial Board
1990-Present	Journal of Biological Chemistry, Editorial Board
1987-1997	NIH MERIT Award
1990-Present	Biochemistry and Molecular Biology/Chemtracts, Editorial Board
1992-Present	National Institutes of Health Parent Committee- Sickle Cell Centers, Chairman, Site Visits-
1996	FDA Committee on Evaluation of Blood Substitutes
1999	International Advisory Board, Vitamin 85 and Carbonyl Catalysis

E. INTERNATIONAL AND NATIONAL MEETINGS - INVITED PRESENTATIONS

1994	Japan Society for Promotion of Science (Lectures throughout Japan)
1994	International Conference on Vitamin 86 and Carbonyl Catalysis, Capri, Italy
1994	International Conference on Strategies for Sickle Cell Anemia, Paris, France
1994	European Peptide Symposium, Braga, Portugal
1995	French Red Cross, Lecture on Blood Substitute Research, Paris, France
1996	National Conference on Blood Substitutes, University of California at San Diego
1996	International Biocatalysis Workshop, Kyoto, Japan
1999	International Conference on Vitamin 86 and Carbonyl Catalysis, Santa Fe NM
2000	Pacificchem International Congress, Honolulu, Hawaii

F. PUBLICATIONS

1. J.S. Nishimura, J.M. Manning, and A. Meister.
Studies on the Mechanism of Activation of Aspartic Acid β -Decarboxylase by α -Keto Acids and Pyridoxal-5'-Phosphate
Biochemistry, 1, 442 (1962).
2. A. Meister, N. Stone, and J.M. Manning.
Conversion of Proline to Hydroxyproline in Collagen Synthesis
Adv. Chem., **44**, 67 (1964).
3. J.M. Manning, and A. Meister.
Conversion of Proline to Collagen Hydroxyproline.
Biochemistry, 5, 1154 (1966).
4. J.M. Manning, and A. Meister.
Conversion of Proline to Collagen Hydroxyproline.
In "Biological and Chemical Aspects of Oxygenases", K. Bloch, and O. Hayaishi, Editors, Tokyo, pp. 27 (1966).
5. P. Fasella, and J.M. Manning.
Substrate Structure and Reaction Specificity in Pyridoxal Dependent Enzymes.
Seventh International Congress of Biochemistry, Supplement I, 1074 (1967).
6. J.M. Manning, R.M. Khomutov, and P. Fasella.
The Reaction of B-Chloroglutamic Acid with Glutamate-Aspartate Transaminase.
Eur. J. Biochem., 5, 109 (1968).

7. J.M. Manning, and S. Moore.
Determination of D- and L-Amino Acids by Ion Exchange Chromatography as L-D and L-L Dipeptides.
J. Biol. Chem., 243, 5591 (1968).
8. J.M. Manning, S. Moore, W.B. Rowe, and A. Meister.
Identification of L-Methionine S-Sulfoximine as the Diastereoisomer of L-MethionineSR-Sulfoximine That Inhibits Glutamine Synthetase.
Biochemistry, 8, 2681 (1969).
9. E. Antonini, M. Brunori, P. Fasella, R. Khomutov, J.M. Manning, and E.S. Severin.
Kinetic Study of the Interaction Between Aspartate Aminotransferase and Threo-, β - Chloroglutarate.
Biochemistry, 9, 1211 (1970).
10. J.M. Manning.
Determination of D- and L-Amino Acid Residues in Peptides. Use of Tritiated Hydrochloric Acid to Correct for Racemization During Acid Hydrolysis.
J. Am. Chem. Soc., 92, 7449 (1970).
11. J.M. Manning, A. Marglin, and S. Moore.
Determination of the Stereochemical Purity of Amino Acid Residues in Peptides.
Proceedings of the Second American Peptide Symposium, Cleveland, Gordon and Breach, New York (1970).
12. J.M. Manning.
Chromatographic Determination of the D- and L-Amino Acid Residues in Pneumococcal C-Polysaccharide.
J. Biol. Chem., **246**, 2926 (1971).
13. A. Cerami, and J.M. Manning.
Potassium Cyanate as an Inhibitor of the Sickling of Erythrocytes *In Vitro*.
Proc. Natl. Acad. Sci., USA, **68**, 1180 (1971).
14. P.N. Gillette, J.M. Manning, and A. Cerami.
Increased Survival of Sick Cell Erythrocytes after Treatment *In Vitro* with NaNCO.
Proc. Natl. Acad. Sci., USA, **68**, 2791 (1971).
15. J.M. Manning,
Determination of D- and L-Amino Acid Residues by Ion Exchange Chromatography.
Methods in Enzymol., 25, 9 (1972).
16. F.G. de Furia, D.R. Miller, A. Cerami, and J.M. Manning.
The Effects of Cyanate *In Vitro* on Red Blood Cell Metabolism and Function in Sick Cell Anemia.
J. Clin. Invest., **51**, 566 (1972).
17. J.M. Manning, A. Cerami, P.N. Gillette, F.G. de Furia, and D.R. Miller.
Chemical and Biological Aspects of the Inhibition of Red Cell Sickling by Cyanate.
Adv. Exp. Med. Biol., **28**, 253 (1972).
18. P.N. Gillette, C.M. Peterson, J.M. Manning, and A. Cerami. Preliminary Clinical Trials with Cyanate.
Adv. Exp. Med. Biol., 28, 261 (1972).
19. J.M. Manning, A. Cerami, P.N. Gillette, F.G. de Furia, and D.R. Miller. Cyanate Inhibition of Red Blood Cell Sickling.
In "Sickle Cell Disease", A. Abramson, J.F. Bertles, and D.L. Wethers, Editors, The C.V. Mosby Company, Saint Louis, pp. 177 (1973).

20. A. Cerami, T.A. Allen, J.H. Graziano, F.G. de Furia, J.M. Manning, and P.N. Gillette. Pharmacology of Cyanate I. General Effects on Experimental Animals. *J. Pharmacol. Exp. Therap.*, **185**, 653 (1973).
21. J.M. Manning, C.K. Lee, A. Cerami, and P.N. Gillette. Gas Chromatographic Determination of the Carbamylation of Hemoglobin by Cyanate. *J. Lab. Clin. Med.*, **81**, 941 (1973).
22. C.K. Lee, J.M. Manning, Kinetics of the Carbamylation of the Amino Groups of Sickle-Cell Hemoglobin by Cyanate. *J. Biol. Chem.* • **2 48**, 5861 (1973).
23. A. Cerami, J.M. Manning, P.N. Gillette, F.G. de Furia, D.R. Miller, J.H. Graziano, and C.M. Peterson. Effect of Cyanate on Red Blood Cell Sickling. *Fed. Proc.*, **32**, 1168 (1973).
24. N. Njikam, W.M. Jones, A.M. Nigen, P.N. Gillette, R.C. Williams, Jr., and J.M. Manning. Carbamylation of the Chains of Hemoglobin S By Cyanate *In Vitro* and *In Vivo*. *J. Biol. Chem.*, **248**, 8052 (1973).
25. J.M. Manning, A. Cerami, P.N. Gillette, F.G. de Furia, and D.R. Miller. Biochemical and Physiological Properties of Carbamylated Hemoglobin S. *Adv. Enzymol.*, **40**, 1 (1974).
26. A.M. Nigen, C.M. Peterson, P.N. Gillette, and J.M. Manning. Determination of the Blood Concentrations of Cyanate after Intravenous Administration to Patients with Sickle-Cell Disease. *J. Lab. Clin. Med.*, **83**, 139 (1974).
27. J.M. Manning, A. Cerami, P.N. Gillette, F.G. de Furia, D.R. Miller, and C.M. Peterson. Inhibition of Red Blood Cell Sickling by Cyanate. *Ann. Okla. Acad. Sci.*, **4**, 47 (1974).
28. J. M. Manning, N.E. Merrifield, W.M. Jones, and E.C. Gotschlich. Inhibition of Bacterial Growth by β -Chloro- D-Alanine. *Proc. Natl. Acad. Sci., USA*, **71**, 417 (1974).
29. A.M. Nigen, N. Njikam, C.K. Lee, and J.M. Manning. Studies on the Mechanism of Action of Cyanate in Sickle Cell Disease. *J. Biol. Chem.*, **249**, 6611 (1974).
30. N. Njikam, A.M. Nigen, C.K. Lee, and J.M. Manning. Preparation and Properties of Hemoglobin S Hybrids Carbamylated on Specific Chains. First National Symposium on Sickle Cell Disease, Washington, D.C., pp. 157 (1974).
31. A.M. Nigen, J.M. Manning, C.M. Peterson, and J.M. White. Bioavailability of Sodium Cyanate in Patients with Sickle Cell Disease and the Lack of Inhibition *In Vitro* of Globin Synthesis at *In Vivo* Concentrations of Cyanate. *J. Pharmacol. Exp. Therap.*, **195**, 333 (1975).
32. A.M. Nigen, and J.M. Manning. The Interaction of Anions with Hemoglobin Carbamylated on Specific NH₂-Terminal Residues. *J. Biol. Chem.*, **250**, 8248 (1975).

33. T.S. Soper, and J.M. Manning.
Synergy in the Antimicrobial Action of Penicillin and β -Chloro-D-Alanine *In Vitro*.
Antimicrob. Agents Chemotherap., **9**, 347 (1976).
34. J.M. Manning, and A.M. Nigen.
Principles Derived from Studies on the Carbamylation of Hemoglobin S.
Proceedings of the Symposium on Molecular and Cellular Aspects of Sickle Cell Disease,
DHEW Publication 76-1007, Dallas, pp. 361 (1976).
35. A.M. Nigen, B.D. Bass, and J.M. Manning.
Reactivity of Cyanate with Valine-I(a) of Hemoglobin as a Probe of Conformational Change.
J. Biol. Chem., **251**, 7638 (1976).
36. R.S. Lane, J.M. Manning, and E.E. Snell.
Histidine Decarboxylase of *Lactobacillus* 30a. Inactivation and Active-Site Labeling by
L-Histidine Methyl Ester.
Biochemistry, **15**, 4180 (1976).
37. T.S. Soper, W.M. Jones, B. Lerner, M. Trop, and J.M. Manning.
Inactivation of Bacterial D-Amino Acid Transaminase by β -Chloro-D-Alanine.
J. Biol. Chem., **252**, 3170 (1977).
38. T.S. Soper, J.M. Manning, P.A. Marcotte, and C.T. Walsh.
Inactivation of Bacterial D-Amino Acid Transaminase by the Olefinic Amino Acid D-
Vinylglycine.
J. Biol. Chem., **252**, 1571 (1977).
39. A.M. Nigen, and J.M. Manning.
Inhibition of Erythrocyte Sickling *In Vitro* by DL-Glyceraldehyde.
Proc. Natl. Acad. Sci., USA, **74**, 367 (1977).
40. A.M. Nigen, and J.M. Manning.
Effects of Glyceraldehyde on the Structural and Functional Properties of Sickle
Erythrocytes.
J. Clin. Invest., **61**, 11 (1978).
41. J.M. Manning, A.M. Nigen, S. Charache, and J.O. Alben.
Major Sites for the Oxygen-Linked Binding of Chloride to Hemoglobin.
In "Clinical Biochemical Aspects of Hemoglobin Abnormalities", W.S. Caughey, Editor,
Academic Press, New York, pp. 687 (1978).
42. J.M. Manning, and A.M. Nigen.
Inhibition of Erythrocyte Sickling *In Vitro* by Glyceraldehyde.
In "Clinical and Biochemical Aspects of Hemoglobin Abnormalities", W.S. Caughey, Editor,
Academic Press, New York, pp. 665 (1978).
43. J.M. Manning, and T.S. Soper.
 β -Elimination of β -Halo Substrates by D-Amino Acid Transaminase Associated with
Inactivation of the Enzyme. Trapping of a Key Intermediate in the Reaction.
Biochemistry, **17**, 3377 (1978).
44. J.M. Manning, and T.S. Soper.
Inactivation of D-Amino Acid Transaminase and the Antibacterial Action of P-Halo
Derivatives of D-Alanine.
In "Enzyme-Activated Irreversible Inhibitors", N. Seiler, J.M. Jung, and J. Koch-Weser,
Editors, Elsevier, New York, pp. 163 (1978).

45. J. M. Manning, and D.A. Driscoll.
Effects of Glyceraldehyde on Erythrocyte Sickling.
In "NIH/INSERM International Meeting on Sickle Cell Disease", Paris, Elsevier, New York,
pp. 187 (1979).
46. T.S. Soper, and J.M. Manning.
Effects of Substrates on the Selective Modification of the Cysteiny Residues of D- Amino
Acid Transaminase.
J. Biol. Chem., 254, 10901 (1979).
47. A.S. Acharya, and J.M. Manning.
Reactivity of the Amino Groups of Carbonmonoxy HemoglobinS with Glyceraldehyde.
J. Biol. Chem., 255, 1406 (1980).
48. A.M. Nigen. J.M. Manning, and J.O. Alben.
Oxygen-Linked Binding Sites for Inorganic Anions to Hemoglobin.
J. Biol. Chem., 255, 5525 (1980).
49. D.A. Uvelli, M.Y. Lee, J.M. Manning, M.P. Hlastala, and A.L. Babb.
Measurement of the Carbamylation Kinetics and Anti-Sickling Mechanism in HbS Blood. *J.*
Lab. Clin. Med., 95, 748 (1980).
50. A.S. Acharya, and J.M. Manning.
Amadori Rearrangement of Glyceraldehyde-Hemoglobin Schiff-Base Adducts. A New
Procedure for the Determination of Ketoamine Adducts in Protein.
J. Biol. Chem., 255, 7218 (1980).
51. C.A. Rouzer, W.A. Scott, Z.A. Cohn, P. Blackburn, and J.M. Manning.
Mouse Peritoneal Macrophages Release Leukotriene C in Response to a Phagocytic
Stimulus.
Proc. Natl. Acad. Sci., USA, 77, 4928 (1980).
52. J.M. Manning.
Preparation of Hemoglobin Carbamylated at Specific NH₂-Terminal Residues.
Methods Enzymol., 7 6, 159 (1981).
53. T.S. Soper, and J.M. Manning.
Different Modes of Action of Inhibitors of Bacterial D-Amino Acid Transaminase. A Target
Enzyme for the Design of New Antibacterial Agents.
J. Biol. Chem., 256, 4263 (1981).
54. R. Benesch, R.E. Benesch, S. Kwong, A.S. Acharya, and J.M. Manning.
Labeling of Hemoglobin with Pyridoxal Phosphate.
J. Biol. Chem., 257, 1320 (1982).
55. D.E. Metzler, J.N. Jansonius, A. Arnone, M. Martinez-Carrion, and J.M. Manning.
Transaminases (ASBC Minisymposium).
Fed. Prod., 41, 2432 (1982).
56. T.S. Soper, and J.M. Manning.
Inactivation of Pyridoxal Phosphate Enzymes by Gabaculine. Correlation with Enzymic
Exchange of β -Protons.
J. Biol. Chem., 257, 13930 (1982).
57. A.S. Acharya, A. Di Donato, B.N. Manjula, V.A. Fischetti, and J.M. Manning.
Influence of Trifluoroacetic Acid on Retention Times of Histidine-Containing Peptides in
Reverse Phase HPLC.
Int. Pep. Prot. Res., 22, 78 (1983).

58. A.S. Acharya, L.G. Sussman, and J.M. Manning.
Schiff Base Adducts of Glyceraldehyde with Hemoglobin. Differences in the Amadori Rearrangement at the α -Amino Groups.
J. Biol. Chem., 258, 2296 (1983).
59. A.S. Acharya, and J.M. Manning.
The Reaction of Glycolaldehyde with Proteins. Latent Cross-Linking Potential of α -Hydroxyaldehydes.
Proc. Natl. Acad. Sci., USA, 80, 3590 (1983).
60. Di Donato, W.J. Fanti, A.S. Acharya, and J.M. Manning.
Selective Carboxymethylation of the α -Amino Groups of Hemoglobin. Effect on Functional Properties.
J. Biol. Chem., 258, 11890 (1983).
61. R. Seetharam, J.M. Manning, and A.S. Acharya.
Specific Modification of the Carboxyl Groups of Hemoglobin S.
J. Biol. Chem., 258, 14810 (1983).
62. A.S. Acharya, L.G. Sussman, W.M. Jones, and J.M. Manning.
Inhibition of Deoxyhemoglobin S Polymerization by Glyceraldehyde.
Anal. Biochem., (Stanford Moore Dedicatory Issue), 136, 101 (1984).
63. J.M. Manning, and A.S. Acharya.
The Mechanism of Action of Two Anti-Sickling Agents: Cyanate and Glyceraldehyde. *Am. J. Ped. Hematol/Oncol.*, 6, 51 (1984).
64. Ueno, T.S. Soper, and J.M. Manning.
Enzyme-Activated Inhibition of Bacterial D-Amino Acid Transaminase by β -Cyano-D-Alanine.
Biochem. Biophys. Res. Commun., 122, 485 (1984).
65. W.M. Jones, T.S. Soper, H. Ueno, and J.M. Manning.
Bacterial D-Amino Acid Transaminase.
Methods Enzymol., 113, 108 (1985).
66. A.S. Acharya, L.G. Sussman. and J.M. Manning.
Selective Modification of the α -Amino Groups of Hemoglobin S by Reductive Alkylation.
J. Biol. Chem., 260, 6039 (1985).
67. T.S. Soper, H. Ueno, and J.M. Manning.
Substrate-Induced Changes in Sulfhydryl Reactivity of Bacterial D-Amino Acid Transaminase.
Arch. Biochem. Biophys., 240, 1 (1985).
68. W.M. Jones, and J.M. Manning.
Acylpeptide Hydrolase Activity from Erythrocytes.
Biochem. Biophys. Res. Commun., 126, 933 (1985)
69. T.S. Soper, and J.M. Manning.
Enzyme-Activated Inhibition of Pyridoxal-Phosphate Enzymes.
In "Transaminases", P. Christen, and D.E. Metzler, Editors, John Wiley and Sons, Inc., New York, pp. 266 (1985).
70. L.J. Benjamin, and J.M. Manning.
Enhanced Survival of Sickle Erythrocytes Upon Treatment . with Glyceraldehyde.
Blood, 67, 544 (1986).

71. N. Mori, and J.M. Manning.
Studies on the Amadori Rearrangement in a Model system: Chromatographic Isolation of Intermediates and Products.
Anal. Biochem., 152, 396 (1986).
72. Ueno, M.A. Pospischil, R. Kluger, and J.M. Manning.
Site-Specific Modification of Hemoglobin by Methyl Acetyl Phosphate.
Arch. Biochem. Biophys., 244, 795 (1986).
73. Ueno, M.A. Pospischil, R. Kluger, and J.M. Manning.
Methyl Acetyl Phosphate: A Novel Acetylating Agent.
J. Chromatogr., 359, 193 (1986).
74. J.M. Manning, A.S. Acharya, A. Di Donato, W.J. Fantl, W.M. Jones, N. Mori, M. Pospischil, and H. Ueno.
Factors that Influence the Reaction of the Amino Groups of Hemoglobin S with Different Compounds.
Inserm Symposium, #141, "Approaches to the Therapy of Sickle Cell Anemia", pp. 195 (1986).
75. L.J. Benjamin, A. Arthur, E. Sneed, and J.M. Manning.
Enhanced Survival and Reduced Density of Sickle Erythrocytes Upon Treatment with Glyceraldehyde.
Inserm Symposium, #141, "Approaches to the Therapy of Sickle Cell Anemia", pp. 217 (1986).
76. W.M. Jones, L.R. Manning, and J.M. Manning.
Enzymic Cleavage of the Blocked Amino Terminal Residues of Peptides.
Biochem. Biophys. Res. Commun., 139, 244 (1986).
77. Ueno, L.J. Benjamin, M.A. Pospischil, and J.M. Manning.
Inhibition of the Gelation of Extracellular and Intracellular Hemoglobin S by Selective Acetylation with Methyl Acetyl Phosphate.
Biochemistry, 26, 3125 (1987).
78. W.J. Fantl, L.R. Manning, H. Ueno, A. Di Donato, and J.M. Manning.
Properties of Carboxymethylated, Cross-Linked Hemoglobin A.
Biochemistry, 26, 5755 (1987).
79. W.J. Fantl, A. Di Donato, J.M. Manning, P.H. Rogers, and A. Arnone.
Specifically Carboxymethylated Hemoglobin as an Analogue of Carbamino Hemoglobin: Solution and X-Ray Studies of Carboxymethylated Hemoglobin and X-Ray Studies of Carbamino Hemoglobin.
J. Biol. Chem., 262, 12700 (1987).
80. J.M. Manning, T.S. Soper, P. Recsei, A. Di Donato, M. Merola, and H. Ueno. . .
Enzyme-Activated Inhibitors of Bacterial D-Amino Acid Transaminase as Antimicrobial Agents. In "Biochemistry of Vitamin B₆", I.U.B. Symposium, T. Korpela and P. Christen, Editors, pp. 305 (1987).
81. H. Ueno, L.J. Benjamin, and J.M. Manning.
Effects of Methyl Acetyl Phosphate on Hemoglobin S: A Novel Acetylating Agent Directed Towards the DPG Binding Site.
In "Pathophysiological Aspects of Sickle Cell Vaso-Occlusion", (R.L. Nagel, ed.), Alan R. Liss, New York, pp. 105 (1987).

82. W.M. Jones, and J.M. Manning.
Substrate Specificity of an Acylaminopeptidase that Catalyzes Cleavage of the Blocked Amino Termini of Peptides.
Biochem. Biophys. Acta, 953, 357 (1988).
83. W.M. Jones, L.R. Manning, and J.M. Manning.
Properties of the Hydrolase that Catalyzes Removal of the Blocked NH₂-Terminal Residues from Polypeptides.
In "Proteins: Structure and Function", Plenum, pp. 675 (1988).
84. W.J. Fanti, A. Di Donato, A. Arnone, and J.M. Manning.
Carboxymethylated Hemoglobin as a Structural Analog for Carbamino Hemoglobin.
In "Proteins: Structure and Function", Plenum, pp. 141 (1988).
85. Ueno, S.S. Koide, J.M. Manning, and S.J. Segal.
Gossypol: Interaction with Ribonuclease A.
In "Proteins: Structure and Function", Plenum, pp. 149 (1988).
86. N. Mori, and J.M. Manning.
Studies on Nonenzymic Glycosylation of Peptides in a Simple Model System.
In "Proteins: Structure and Function", Plenum. pp. 161 (1987).
87. L.R. Manning, and J.M. Manning.
Influence of the Ligation State and the Concentration of Hemoglobin A on Its Cross-Linking by Glycolaldehyde: Functional Properties of Cross-Linked Carboxymethylated Hemoglobin.
Biochemistry, 27, 6640 (1988).
88. N. Mori, Y. Bai, H. Ueno, and J.M. Manning.
Sequence Dependent Reactivity of Model Peptides with Glyceraldehyde.
Carbohydr. Res. 189, 49 (1989).
89. M. Merola, A. Martinez del Pozo, H. Ueno, P. Recsei, A. Di Donato, J.M. Manning, K. Tanizawa, Y. Masu, S. Asano, H. Tanaka, K. Soda, D. Ringe, and G. Petsko.
Site-Directed Mutagenesis of the CysteinyI Residues of D-Amino Acid Transaminase.
Biochemistry. 28, 505 (1989).
90. A. Martinez del Pozo, M. Merola, H. Ueno, J.M. Manning, K. Tanizawa, Y. Masu, S. Asano, H. Tanaka, K. Soda, D. Ringe, and G. Petsko.
Activity and Spectroscopic Properties of Bacterial D-Amino Acid Transaminase After Multiple Site-Directed Mutagenesis of a Single Tryptophan Residue.
Biochemistry, 28, 510 (1989)
91. A. Martinez del Pozo, H. Ueno, M. Merola, C. Danzin, and J.M. Manning.
 γ -Acetylenic- γ -Aminobutyrate as an Enzyme-Activated Inhibition of D-Amino Acid Transaminase.
Biochimie, 71, 505 (1989).
92. Y. Bai, H. Ueno, and J.M. Manning.
Some Factors that Influence the Non-Enzymic Glycation of Peptides and Polypeptides by Glyceraldehyde.
J. Prot. Chem. 8. 299 (1989).
93. Ueno, and J.M. Manning.
Methyl Acetyl Phosphate, A New Type of Antisickling Agent: Site-Specific Acetylating Agent Directed Towards the 2,3-DPG Binding Site in Hemoglobin S.
Am. J. Pediatr. Hematol. Oncol., 10, 348 (1989).

94. Ueno, Y. Bai, and J.M. Manning.
Covalent Chemical Modifiers of Sick Cell Hemoglobin.
Ann. N.Y. Acad. Sci., 565, 239 (1989).
95. Ueno, M.A. Pospischil, and J.M. Manning.
Methyl Acetyl Phosphate as a Covalent Probe for Anion Binding Sites in Hemoglobin.
J. Biol. Chem., 264, 12344 (1989).
96. Martinez del Pozo, M. Merola, H. Ueno, J.M. Manning, K. Tanizawa, K. Nishimura, H. Tanaka, K. Soda, and D. Ringe.
Stereochemistry of Reactions Catalyzed by Bacterial D-Amino Acid Transaminase.
J. Biol. Chem., 264, 17784 (1989).
97. Martinez del Pozo, M.A. Pospischil, H. Ueno, J.M. Manning, K. Tanizawa, K. Nishimura, K. Soda, D. Ringe, B. Stoddard, and G.A. Petsko.
Effects of D-Serine on Bacterial D-Amino Acid Transaminase: Accumulation of an Intermediate and Inactivation of the Enzyme.
Biochemistry, 28, 8798 (1989)
98. J.M. Manning, A. Martinez del Pozo, H. Ueno, K. Tanizawa, K. Nishimura, K. Soda, D. Ringe, and G. Petsko.
Bacterial D-Amino Acid Transaminase: Stereospecificity of The Reaction Pathway: Spectral Effects and Inactivation Generated by D-Serine.
Ann. NY Acad. Sci., 585, 516 (1990).
99. L.R. Manning, W.J. Fantl, and J.M. Manning.
Functional Measurements on Carboxymethylated Hemoglobin: A Potential Blood Substitute: Effects of Sodium Chloride on pH Values that Influence the Alkaline Bohr Effect.
Bio. Art. Cells Art. Org., 18, 133 (1990).
100. S. Futaki, H. Ueno, A. Martinez de Pozo, M.A. Pospischil, J.M. Manning, Dagmar Ringe, Barry Stoddard, and K. Soda.
Substitution of Glutamine for Lysine at the Pyridoxal Phosphate Binding Site of Bacterial D-Amino Acid Transaminase Leads to an Active but Attenuated Enzyme: Effects of Exogenous Amines on the Slow Formation of Intermediates.
J. Biol. Chem., 265, 22306 (1990).
101. J.M. Manning.
Covalent Inhibitors of the Gelation of Sick Cell Hemoglobin That Also Reveal Some Basic Functions of Hemoglobin.
Adv. Enzymol. and Mol. Biol., 64, 55 (1991).
102. L.R. Manning, S. Morgan, R.C. Beavis, B.T. Chait, J.M. Manning, J. Hess, M. Cross, D. Currell, M. Marini, and R.M. Winslow.
Preparation, Properties and Plasma Retention of Human Hemoglobin Derivatives: Comparison of Uncrosslinked, Carboxymethylated Hemoglobin with Crosslinked Tetrameric Hemoglobin.
Proc. Natl. Acad. Sci. 88, 3329 (1991).
103. K. Nishimura, K. Tanizawa, T. Yoshimura, N. Esaki, S. Futaki, J.M. Manning and K. Soda.
Effects of Replacement of Pyridoxal Phosphate Binding Lysyl Residue of Thermostable D-Amino Acid Transaminase by Arginine or Alanine.
Biochemistry 30, 4072 (1991).

104. W.M. Jones, A. Scaloni, F. Bossa, A.M. Popowicz, O. Schneewind and J.M. Manning.
Genetic Relationship Between Acylpeptide Hydrolase and Acylase, Two Hydrolytic Enzymes with Similar Binding but Different Catalytic Properties.
Proc. Natl. Acad. Sci. 88, 2194 (1991).
105. K. Nishimura, K. Tanizawa, T. Yoshimura, N. Esaki, J.M. Manning and K. Soda
Thermostable d-Amino acid aminotransferase: Substitution of arginyl and alanyl residues for lysine. In: *Enzymes Dependent on Pyridoxal Phosphate and Other Carbonyl Compounds as Cofactors*, (Fukui, T., Kagamiyama, H., Soda, K. and Wada, H., Eds.). Proceedings of the 8th International Symposium on Vitamin B₆ and Carbonyl Catalysis, Pergamon Press, p. 215-216, Osaka, Japan, 1991.
106. Scaloni, W.M. Jones, D. Barra, M. Pospischil, S. Sassa, A. Popowicz, L.R. Manning, O. Schneewind, and J.M. Manning.
Acylpeptide Hydrolase: Inhibitors of the Human Enzyme and Some of Its Active Site Residues.
J. Biol. Chem. 267, 3811 (1992).
107. Ueno and J.M. Manning.
The Functional, Oxygen-linked Chloride Binding Sites of Hemoglobin are Contiguous Within a Channel in the Central Cavity.
J. Prot. Chem. 11, 177 (1992).
108. M. Moriguchi, L.R. Manning, and J.M. Manning.
Nitric Oxide Can Modify Amino Acid Residues in Proteins. *Biochem. Biophys. Res. Commun.* 183, 598 (1992).
109. H. Ueno, E. Yatco, L.J. Benjamin, and J.M. Manning.
Effects of Methyl Acetyl Phosphate. a Covalent Anti-Sickling Agent, on the Density Profiles of Sickle Erythrocytes.
J. Lab. Clin. Med. 120, 152 (1992).
110. Martinez del Pozo, T. Yoshimura, M.B. Bhatia, S. Futaki, D. Ringe, K. Soda, and J.M. Manning.
Inactivation of Dimeric D-Amino Acid Transaminase by Its Normal Substrate Through Coenzyme Immobilization in One Subunit.
Biochemistry 31, 6018 (1992).
111. Scaloni, W. Jones, M. Pospischil, S. Sassa, O. Schneewind, A.M. Popowicz, F. Bossa, and J.M. Manning.
Deficiency of Acylpeptide Hydrolase in Small Cell Lung Carcinoma Cell Lines.
J. Lab. Clin. Med. 120, 547 (1992). Accompanying Editorial.
112. T. Yoshimura, M. Bhatia, D. Ringe, K. Soda, and J.M. Manning.
Bacterial D-Amino Acid Transaminase with an Asparagine Substituted for the Active Site Lysine Retains Significant Catalytic Activity: Implications for the Role of Lysine Attached to Coenzyme PLP.
Biochemistry 31, 11748 (1992).
113. J. Martin de Llano, O. Schneewind, G. Stetler, and J.M. Manning.
Recombinant Sickle Hemoglobin in Yeast.
Proc. Natl. Acad. Sci. 90, 918 (1993).
114. M.B. Bhatia, S. Futaki, H. Ueno, D. Ringe, T. Yoshimura, K. Soda and J.M. Manning.
Kinetic and Stereochemical Comparison of Wild-type and Active Site Mutant Enzymes of Bacterial D-amino Acid Transaminase.
J. Biol. Chem. 268, 6932 (1993).

115. K. Nishimura, T. Yoshimura, J. Ito, N. Esaki, H. Kagamiyama, K. Soda and J.M. Manning
Catalytic C-4' Protonation of the Pyridoxal Phosphate Cofactor in D-Amino Acid and
Branched-Chain-L-Amino Acid Aminotransferases: Opposite Stereochemistry to the Other
Aminotransferases.
J. Amer. Chem. Soc. 115, 3897 (1993).
116. J.M. Manning
The Contributions of Stein and Moore to Protein Science.
Protein Science 2, 1188 (1993).
117. M.B. Bhatia, A. Martinez del Pozo, D. Ringe, T. Yoshimura, K. Soda, and J.M. Manning.
Role Reversal for Substrates and Inhibitors: Inactivation of D-Amino Acid Transaminase by
Its Normal Substrates and Protection by Inhibitors.
J. Biol. Chem. 268, 17687 (1993).
118. M. Feese, A. Scaloni, W.M. Jones, S.J. Remington, and J.M. Manning.
Crystallization and Preliminary X-Ray Studies of Human Erythrocyte Acylpeptide
Hydrolase.
J. Mol. Biol. 233, 546 (1993).
119. J.I. Martin de Llano, W. Jones. K. Schneider, B.T. Chait. G. Rodgers, L.J. Benjamin, B.
Weksler. and J.M. Manning.
Biochemical and Functional Properties of Recombinant Human Sickle Hemoglobin
Expressed in Yeast.
J. Biol. Chem. 268, 27004 (1993).
120. J.J. Martin de Llano, O. Schneewind, G.L. Stetler, and J.M. Manning.
Purification and Characterization of Recombinant Human Sickle Hemoglobin Expressed in
Yeast.
Methods Enzymol. 231 (Part B). 390-403 (1994).
121. J.M. Manning.
Preparation of Hemoglobin Derivatives Selectively or Randomly Modified at Amino Groups.
Methods Enzymol. 231. 225-246 (1994).
122. Ueno. A.M. Popowicz., and J.M. Manning.
Random Chemical Modification of the Oxygen-linked Chloride Binding Sites of
Hemoglobin: Those in the Central Dyad Axis May Influence the Transition Between Deoxy-
and Oxy- Hemoglobin. *J. Prot. Chem.* 12, 561-570 (1994).
123. W.M. Jones, D. Ringe, K. Soda, and J.M. Manning.
Determination of Free D-Amino Acids with a Bacterial Transaminase: Their Depletion
Leads to Inhibition of Bacterial Growth.
Anal. Biochem. 218, 204-209 (1994).
124. Scaloni, D. Barra, W.M. Jones, and J.M. Manning.
Human Acylpeptide Hydrolase: Studies on its Thiol Groups and Mechanism of Action.
J. Biol. Chem. 269, 15076-15084 (1994).
125. Y. Vodovotz, N.S. Kwon. M. Pospischil, J. Manning, J. Paik, and C. Nathan. Inactivation of
Nitric Oxide Synthase after Prolonged Incubation of Mouse Macrophages with IFN- γ and
Bacterial Lipopolysaccharide.
J. Immunol. 152, 4110-4118 (1994).
126. J.J. Martin de Llano and J.M. Manning.
Properties of a Recombinant Human Hemoglobin Double Mutant: Sickle Hemoglobin with
Leu-88(B) at the Primary Aggregation Site Substituted by Ala.
Protein Science 3, 1206-1212 (1994).

127. Yanase, S. Cahill, J.J. Martin de Llano, L.R. Manning, K. Schneider, B.T. Chait, K.D. Vandegriff, R.M. Winslow, and J.M. Manning. Properties of a Recombinant Human Hemoglobin with Aspartic Acid 99(β), an Important Inter-Subunit Contact Site, Substituted by Lysine. *Protein Science* 3, 1213-1223 (1994).
128. E. Stole, T.K. Smith, J.M. Manning and A. Meister. Interaction of γ -Glutamyl Transpeptidase with Acivicin. *J. Biol. Chem.* 269, 21435-21439 (1994).
129. W.M. Jones, A. Scaloni, and J.M. Manning. Acylpeptide Hydrolase (Acylaminoacyl-peptidase). *Methods Enzymol.* 244, 227-231 (1994).
130. Yanase. L.R. Manning, K. Vandegriff. R.M. Winslow and J.M. Manning. A Recombinant Human Hemoglobin with Asparagine-102(β) Substituted by Alanine Has a Limiting Low Oxygen Affinity c Reduced Marginally by Chloride. *Protein Science* 4, 21 (1995).
131. J.M. Manning
Design of Chemically Modified and Recombinant Hemoglobins as Potential Red Cell Substitutes. In *Blood Substitutes Research and Development*. R.M. Winslow, K.D. Vandegriff and M. Intaglietta (Eds.), Birkhauser, Boston (1995), pgs. 76-89.
132. J.M. Manning and W.M. Jones.
Determination of D-Amino Acids with a Bacterial Transaminase.
In: *Peptides 1994. Proceedings of the Twenty-Third European Peptide Symposium*, Braga. Portugal. H.L.S. Maia (Ed.), Escom. Leiden, pgs. 414-415 (1995).
133. J.M. Manning.
In: *Proceedings of the International Conference on New Trends in Therapy for Hemoglobinopathies and Thalassemias*. Paris, France. Y. Beuzard, B. Lubin and J. Rosa (Eds.), John Libbey & Co., London, pgs. 303-304 (1995).
134. J.J. Martin de Llano, L.J. Benjamin, and J.M. Manning.
In: *Proceedings of the International Conference on New Trends in Therapy for Hemoglobinopathies and Thalassemias*. Paris, France. Y. Beuzard, B. Lubin and J. Rosa (Eds.). John Libbey & Co. • London, pgs. 313 (1995).
135. J.-P. Himanen, K. Schneider, B. Chait, and J.M. Manning.
Participation and Strength of Interaction of Lys-95(β) in the Polymerization of Hemoglobin S as Determined by Its Site-Directed Substitution by Ile.
J. Biol. Chem. 270, 13885 (1995).
136. S. Sugio, G.A. Petsko, J.M. Manning, K. Soda, and D. Ringe.
Crystal Structure of a D-Amino Acid Aminotransferase: How the Protein Controls Stereoselectivity.
Biochemistry 34, 9661 (1995)
137. P.W. Van Ophem, M.A. Pospischil, D. Ringe, D. Peisach, G. Petsko. K. Soda. and J.M. Manning.
Catalytic Ability and Stability of Two Recombinant Mutants of D-Amino Acid Transaminase Involved in Coenzyme Binding.
Protein Science 4. 2578 (1995).
138. D. Liao, J.J. Martin de Llano, J-P. Himanen, J.M. Manning, and F.A. Ferrone. Solubility of Sickle Hemoglobin Measured by a Kinetic Micromethod.
Biophys. J. 70, 2442 (1996).

139. Martinez del Pozo, P.W. Van Ophem, K. Soda, D. Ringe, and J.M. Manning.
Role of Trp-139 at the Subunit Interface of D-Amino Acid Transaminase.
Biochemistry 35, 2112 (1996).
140. L.R. Manning, W.T. Jenkins, J.R. Hess, K. Vandegriff, R.M. Winslow, and J.M. Manning.
Subunit Dissociations in Natural and Recombinant Hemoglobins.
Protein Science 5, 775 (1996).
141. M. Nozue, I. Lee, J.M. Manning, L. R. Manning, and R. K. Jain.
Oxygenation in Tumors by Modified Hemoglobins.
J. of Surgical Oncology. 62, 109-114 (1996).
142. J.M. Manning
Examples of Chemical Modification and Recombinant DNA Approaches with Hemoglobin.
Transfusion Clinique et Biologique. 2, 109-111 (1996).
143. J.-P. Himanen, U.S. Mirza, B.T. Chait, RM. Bookchin, and J.M. Manning.
A Recombinant Sickle Hemoglobin Triple Mutant with Independent Inhibitory Effects on Polymerization.
J Biol. Chem. 271. 25152-25156 (1996).
144. W.M. Jones, P. van Ophem, M.A. Pospischil, K. Soda, and J.M. Manning.
The Ubiquitous Cofactor NADH Protects Against Substrate-Induced Inhibition of a Pyridoxal Enzyme.
Protein Science. 5, 2545-2551 (1996).
145. Antoine Dumoulin, LR. Manning, W.T. Jenkins, R.M. Winslow, and J.M. Manning
Exchange of Subunit Interfaces between Recombinant Adult and Fetal Hemoglobins.
Evidence for a Functional Inter-relationship among Regions of the Tetramer.
J. Biol. Chem. 272. 31326-31332 (1997).
146. Xianfeng Li, U.A. Mirza, B.T. Chait, and J.M. Manning.
Systematic Enhancement of Polymerization of Recombinant Sickle Hemoglobin Mutants:
Implications for Transgenic Mouse Model for Sickle Cell Anemia.
Blood. 90, 4620-4627 (1997).
147. Zhiqi Cao, D., Liao, R. Mirchev, J.J. Martin de Llano, J.-P. Himanen, J M. Manning, and F.A. Ferrone.
Nucleation and Polymerization of Sickle Hemoglobin with Leu β 88 Substituted by Ala.
J. Mol. Biol. 265, 580-589 (1997).
148. Frank H. Highsmith, C.M. Driscoll, B.C. Chung, M.D. Chavez, V.W. MacDonald, J.M. Manning, LE. Lippert, R.L. Berger, and J.R. Hess.
An Improved Process for The Production of Sterile Modified Hemoglobin Solutions.
Biologicals. 25, 257-268 (1997).
149. Lidong Liu, T. Yoshimura, K. Endo, K. Kishimoto, Y. Fuchikami, J.M. Manning, N. Esaki, and K. Soda.
Compensation for D-Glutamate Auxotrophy of *Escherichia coli* WM335 by D-Amino Acid Aminotransferase Gene and Regulation of *murl* Expression.
Biosci. Biotechnol. Biochem. 62, 193-195 (1998).
150. Peter W. van Ophem, S.D. Erickson, A.M. del Pozo. I. Haller, B.T. Chait, T. Yoshimura, K. Soda, D. Ringe, G. Petsko, and J.M. Manning.
Substrate Inhibition of D-Amino Acid Transaminase and Protection by Salts and by Reduced Nicotinamide Adenine Dinucleotide: Isolation and Initial Characterization of a Pyridoxo Intermediate Related to Inactivation.
Biochemistry. 37, 2879-2888 (1998)

151. Daniel Peisach, D.M. Chipman, P.W. van Ophem, J.M. Manning, and D. Ringe. D-Cycloserine Inactivation of D-Amino Acid Aminotransferase Leads to a Stable Noncovalent Protein Complex with an Aromatic Cycloserine-PLP Derivative. *J. Amer. Chem. Soc.* 120, 2268-2274 (1998).
152. Daniel Peisach, D.M. Chipman, W.W. van Ophem, J.M. Manning, and D. Ringe. Crystallographic Study of Steps along The Reaction Pathway of D-Amino Acid Aminotransferase. *Biochemistry.* 37, 4958-4967 (1998).
153. James M. Manning, A. Dumoulin, X. Li, and LR Manning. Normal and Abnormal Proteins Subunit Interactions in Hemoglobins. *J. Biol. Chem.* 273, 19359-19362 (1998)[MiniReview].
154. James M. Manning. "Acylaminoacyl-Peptidase" in Handbook of Proteolytic Enzymes. A.J. Barrett & N.D. Rawlings (Eds), Academic Press.
155. Antoine Dumoulin, J. C. Padovan, LR Manning, A. Popowicz, R.M. Winslow, B.T. Chait, and J.M. Manning. The N-Terminal Sequence Affects Distant Helix Interactions in Hemoglobin. *J Biol. Chem.* 273. 35032 - 35038 (1998).
156. Peter van Ophem, D. Peisach, S.D. Erickson, K. Soda, D. Ringe, and J.M. Manning. Effects of The E177K Mutation in D-Amino Acid Transaminase. Studies of an Essential Coenzyme Anchoring Group that Contributes to Stereochemical Fidelity. *Biochemistry.* 38, 1323-1331 (1999)
157. Lois R. Manning, A. Dumoulin, W.T. Jenkins, RM. Winslow, and J.M. Manning. A Convenient Sensitive Method for Estimating Subunit Dissociation Constants in Neuronal and Recombinant Proteins. *Methods in Enzymology.* 306, 113-129 (1999).
158. Xianfeng Li, J.-P. Himanen, J.J. Martin de Llano, J.C. Padovan, B.T. Chait, and J.M. Manning. Mutational Analysis of Sickle Hemoglobin Analysis. *Biotechnology and Applied Biochemistry.* 29, 165-184 (1999).
159. Andrea Scaloni, P. Ingallinella, A. Andolfo, W. Jones, G. Marino, and J.M. Manning. Structural Investigations of Human Erythrocyte Acylpeptide Hydrolase by Mass Spectrometric Procedures. *J Protein Chem.* 18, 349-360 (1999).
160. James M. Manning, A. Dumoulin, LR Manning, W. Chen, J.C. Padovan, B.T. Chait, and A Popowicz. Remote Contributions to Subunit Interactions: Lessons from Adult and Fetal Hemoglobins. *Trends in Biochemical Sciences (TIBS).* 24, 211-212 (1999).
161. Kazuhisa Kishimoto, C. Yasuda, and J.M. Manning. Reversible Dissociation/Association of D-Amino Acid Transaminase Subunits: Properties of Isolated Dimers and Inactive Monomers. *Biochemistry.* 39, 381-387 (2000).
162. D.A Bulik, P. van Ophem, J.M. Manning, D.S. Newburg, E.L. Jarroll. UDP-N-Acetylglucosamine Pyrophosphorylase, A Key Enzyme in Encysting Giardia, is Allosterically Regulated. *J. Biol. Chem.* 275, 14722-14728 (2000).

163. Weihua Chen, A Dumoulin, X. Li, J.C. Padovan, B.T. Chait, R. Buonopane, O.S. Platt, L. R. Manning, and J.M. Manning.
Transposing Sequences between Fetal and Adult Hemoglobins Indicates Which Subunits and Regulatory Molecule Interfaces are Functionally Related.
Biochemistry. 39, 3774-3781 (2000).
164. P.W. van Ophem, B.W. Lepore, K. Kishimoto, D. Ringe, and J.M. Manning.
Studies on an Active Site Mutant, E177, That Affects Binding of The Coenzyme on a Suicide Substrate.
Biochemistry and Molecular Biology of Vitamin B₆ and PQQ-Dependent Proteins. (Eds. A. Iraiarte, H. M. Kagan, and M. Martinez-Carrion). 339-349 (2000).
165. K. Inagaki, J. Inagaki, A Dumoulin, J.C. Padovan, B.T. Chait, A Popowicz, LR. Manning, and J.M. Manning.
Expression and Properties of Recombinant HbA₂ ($\alpha_2\delta_2$) and Hybrids Containing δ - β Sequences.
J. Prot. Chem. 19, 647-660 (2000).
166. LR. Manning and J.M. Manning.
The Acetylation State of Human Fetal Hemoglobin Modulates The Strength of Its Subunit Interactions: Long-Range Effects and Implications for Histone Interactions in The Nucleosome.
Biochemistry. 40, 1635-1639 (2001).
167. K. Kishimoto and J.M. Manning. Adherence of Vancomycin to Proteins. *J. Protein Chem.* 20, 455-461 (2001).
168. T. Yagami, B.T. Ballard, J.C. Padovan, B.T. Chait, AM. Popowicz, and J.M. Manning.
N-Terminal Contributions of γ -Subunit of Fetal Hemoglobin to its Tetramer Strength: Remote Effects of Subunit Contacts. *Protein Science*. 11, 27-35 (2002).
169. X. Li, R.W. Briehl, R.M. Bookchin, R. Josephs, B. Wei, J.M. Manning and F.A. Ferrone.
Sickle Hemoglobin Polymer Stability Probed By Triple and Quadruple Mutant Hybrids.
J. Biol. Chem. 277, 13479-13487. (2002)
170. Y. Zhang, LR. Manning, J. Falcone, O. Platt, and J.M. Manning.
Human Erythrocyte Membrane Band 3 Protein Influences Hemoglobin Cooperativity.
J. Biol. Chem. 278, 39565-39571 (2003).
171. A. Geva, J.M. Clark, Y. Zhang, A. Popowicz, J.M. Manning, and E.J. Neufeld. Hemoglobin Jamaica Plain - A Sickling Hemoglobin with a Reduced Oxygen Affinity.
N. Engl. J. Med. 351, 1532-1538 (2004).
172. J.M. Manning.
Acylaminococyl-peptide (Acylpeptide Hydrolase) Handbook of Proteolytic Enzymes, 2nd Ed. Elsevier, pgs. 1917-1919 (2004).
173. M. Ashiuchi, T. Yagami, R.J. Willey, J.C. Padovan, B.T. Chait, A. Popowicz, LR. Manning, and J.M. Manning.
N-Terminal Acetylation and Protonation of Individual Hemoglobin Subunits.
Protein Science, 14, 1458-1471 (2005).
174. LR. Manning, J.E. Russell, J.C. Padovan, B.T. Chait, A. Popowicz, R.S. Manning, and J.M. Manning.
Human Embryonic, Fetal and Adult Hemoglobins Have Different Subunit Interface Strengths. Correlation with Lifespan in The Red Cell.
Protein Science, 16, 1641-1658 (2007).

175. L.R. Manning, J.E. Russell, A.M. Popowicz, R.S. Manning, J.C. Padovan, and J.M. Manning.
Energetic Differences at the Subunit Interfaces of Normal Human Hemoglobins Correlate with their Developmental Profile.
Linking Gene Expression, Thermodynamics, and Development.
Biochemistry, 48, 7568-7574 ("New Concept" Article) (2009).
176. LR. Manning, AM. Popowicz, J. Padovan, B.T. Chait, J.E. Russell, and J.M. Manning.
Developmental Expression of Human Hemoglobins Mediated by Maturation of Their Subunit Interfaces.
Protein Science, 19, 1595-1599 (2010).
177. J.M. Manning, A.M. Popowicz, J.C. Padovan, B.T. Chait, and L.R. Manning.
Intrinsic Regulation of Hemoglobin Expression by Variable Subunit Interface Strengths.
FEBS Journal, 279, 361-369 (2012) (Review).
178. L.R. Manning, A.M. Popowicz, J.C. Padovan, B.T. Chait, and J.M. Manning.
Gel Filtration of Dilute Human Embryonic Hemoglobins Reveals Basis for Their Increased Oxygen Binding. *Analytical Biochemistry* 519, 38-41 (2017).
179. L.R. Manning, A.M. Popowicz, J.C. Padovan, B.T. Chait, and J.M. Manning.
Assembly Equilibria of Root Effect Fish Hemoglobins and Bohr Effect Human Hemoglobins Influence Their Different Oxygen Binding and Release. Manuscript in preparation (2017).
180. L.R. Manning and J.M. Manning
Interactive Propagation of Phosphorylation / Acetylation in Histone H3 Peptides. Implications for Nucleosome Dynamics. Manuscript in preparation (2017).