CURRICULUM VITAE

Edward J. (E.J.) Crane III, Ph.D.
Department of Chemistry
Pomona College
Claremont, CA 91711

Office: 909-607-9634
Cell: 909-532-4163
Fax: 909-607-7726
email: ej.crane@pomona.edu

EDUCATION

B.S., Biology 1983-87
St. Cloud State University, St. Cloud, MN

Ph.D., Biochemistry 1987-92
The Johns Hopkins University, Baltimore, MD
Advisor: M.W. Washabaugh

POSTGRADUATE TRAINING AND EMPLOYMENT

Postdoctoral Fellow 1992-96
Wake Forest University, The Bowman Gray School
of Medicine, Winston-Salem, NC
Mentor: A. Claiborne

Assistant Professor 1996-02
Department of Chemistry
Salisbury University
Salisbury, MD

Visiting Professor of Biochemistry 2002
Tokyo University of Agriculture and Technology
Tokyo, Japan

Assistant Professor 2002-08
Department of Chemistry
Pomona College
Claremont, CA

Chair of Chemistry 2008-present
Department of Chemistry
Pomona College
Claremont, CA

FELLOWSHIPS AND GRANTS

American Chemical Society, Petroleum Research Fund, (PI), title, *Mechanisms of Sulfur Reduction by Sulfur/Polysulfide Reductase,* funded, $55,000 2007-2009

Department of Energy, Genomes to Life Initiative, (CoPI), title, *Integrated Genome-Based Studies of Shewanella Ecophysiology*, funded 2007-09

Cottrell College Science Award (PI) (Research Corporation, title, "*Enzymatic mechanisms of control of internal redox environment in hyperthermophiles"*) $39,036 2003-05

HHMI Award (contributor) (Howard Hughes Medical Institute, Undergraduate Science Education Program) 2003-06

Major Research Instrumentation Grant (CoPI) (NSF, title, *Genomic and Genetic Analysis Research in Molecular Biology at Pomona College*) $235,780 2003-06

Pfizer Summer Research Fellowship (mentor) (Pfizer, "*Engineering a Peroxidase from an Oxidase: Replacing the Catalytic Cysteine of the NADH Oxidase of Pyrococcus furiosus with Selenocysteine*) $7,500 2004

Cottrell College Science Award (PI) (Research Corporation, title, "*A mechanistic study of thermophilic NADH oxidases from Pyrococcus: Are thermophilic and mesophilic catalytic strategies different?"*) $40,000 2000-02

National Research Service Award (Postdoctoral Fellowship, National Institutes of Health) ~$60,000 1994-96

HONORS AND AWARDS

Wig Distinguished Professor (Pomona College) 2005

Distinguished Faculty Award (Salisbury University) 1999

National Research Service Award (National Institutes of Health) 1994-96

Harry D. Kruse Award in Nutrition and Public Health (The Johns Hopkins University) 1992

Graduated with honors in liberal studies, Magna Cum Laude (St. Cloud State University) 1987

PUBLICATIONS

Peer reviewed articles

1. Lancaster, K., Farver, O., Wherland, S., Crane, E.J. III, Richards, J.H., Israel Pecht, I., and Gray, H.B., Electron Transfer Reactivity of Type Zero *Pseudomonas aeruginosa* Azurin, *The Journal of the American Chemical Society*, In Press, on web as ASAP (2011).

2. Warner, M., Lukose, V., Lee, K. H., Lopez, K., Sazinsky, M. H., and Crane, E.J. III.:

Characterization of an NADH-Dependent Persulfide Reductase from *Shewanella loihica* PV-4: Implications for the Mechanism of Sulfur Respiration via FAD-Dependent Enzymes. *Biochemistry*. 50:194-206 (2011).

3. Richards, G. Watson, M.A., Crane III, E.J., Burt, I.G., and Bushek, D.: *Shewanella* species in oysters and seawater from the Delaware Bay, Applied and Environmental Microbiology. 74:3323-7. (2008).

4. Boylan, J. A., Hummel, C., Benoit, S., Garcia-Lara, J., Treglown, J., Crane, E.J. III, and Gherardini, F.C.: Identification of a Coenzyme A Disulfide Reductase from *Borrelia burgdorferi*. Molecular Microbiology 59:475-486 (2006).

5. Hummel, C.S., Lancaster, K.M., and Crane, E.J. III: Determination of coenzyme A levels in *Pyrococcus furiosus* and other Archaea: implications for a general role for coenzyme A in thermophiles. FEMS Microbiological Letters 252:229-234 (2005).

6. Harris, D. R., Ward, D. E., Feasel, J. T., Lancaster, K.M., Murphy, R.D., Mallet, T.C. and Crane, E.J. III.: Discovery and characterization of a Coenzyme A disulfide reductase from *Pyrococcus horikoshii:* Implications for the disulfide metabolism of anaerobic hyperthermophiles. FEBS Journal 272:1189-1200 (2005).

7. Ward, D., Donnelly, C., Mullendore, M., van der Oost, J., de Vos, W., and Crane, E.J. III.: The NADH oxidase from *Pyrococcus furiosus*: Implications for the protection of anaerobic hyperthermophiles against oxidative stress. Eur. J. Biochem. 268: 5816-5823 (2001).

8. Crane, E.J. III, Yeh, J., Luba, J. and Claiborne, A.: Analysis of the kinetic and redox properties of the NADH peroxidase R303M mutant: Correlation with the crystal structure. Biochemistry 39: 10353-10364 (2000).

9. Claiborne A., Yeh, J., Mallett, T., Luba, J., Crane E.J. III, Charrier, V., and Parsonage, D.: Protein sulfenic acids: Diverse roles for an unlikely player in enzyme catalysis and redox regulation. Biochemistry 38:15407-15416 (1999).

10. Crane, E.J. III, Vervoort, J., and Claiborne, A.: ^{13}C NMR analysis of the cysteine-sulfenic acid redox center of enterococcal NADH peroxidase. Biochemistry 36:8611-8618 (1997).

11. Crane, E.J. III, Parsonage, D. and Claiborne, A.: The active site His10 of enterococcal NADH peroxidase is not essential for catalytic activity. Biochemistry 35:2380-2387 (1996).

12. Crane, E.J. III, Poole, L.B., Parsonage D., and Claiborne, A.: Analysis of the kinetic mechanism of enterococcal NADH peroxidase reveals catalytic roles for NADH complexes with both oxidized and two-electron reduced enzyme forms. Biochemistry 43:14114-14124 (1995).

13. Vacarro, J., Crane, E.J. III, Harris, T.K. and Washabaugh, M.W.: Mechanism of reconstitution of brewer's yeast pyruvate decarboxylase with thiamin diphosphate and magnesium. Biochemistry 34:12636-12644 (1995).

14. Crane, E.J. III, Vacarro, J., and Washabaugh, M.W.: Single-turnover studies on brewer's yeast pyruvate decarboxylase: C(2)-proton transfer from thiamin diphosphate. J. Am. Chem. Soc. 115:8912-8917 (1993).

15. Crane, E.J. III, and Washabaugh, M.W.: Retrograde aldol-type reactions involving thiamin in aqueous solution: Evidence for changes in transition state structure. Bioorg. Chem. 20: 251-264 (1992).

16. Crane, E.J. III, and Washabaugh, M.W.: General acid catalysis of the cleavage of 2-(1-hydroxybenzyl)thiamin by a preassociation mechanism. Bioorg. Chem. 19: 351-368 (1991).

Book chapters

1. Lukose, V., Lopez, K., and Crane, E.J. III. InDiscovery and Characterization of an NADH-dependent polysulfide reductase flavoprotein (Npsr) from *Shewanella loihica* PV-4: Implications for dissimilatory sulfur reduction in the genus *Shewanella*. In: *Flavins and Flavoproteins 2008*

2. Crane, E.J. III, Hummel, C.S. and Hall, Evan T., Redox Enzymes in the Archaea, In: *Archaea: New Paradigms in Prokaryotic Biology* (Paul Blum, Ed.) Horizon Press.

3. Courtney Davis, Ryan Murphy, Kyle Lancaster, Ganesh Devendra, and E.J. Crane III A Mechanistic Comparison of the *Pyrococcal* NADH Oxidase and Coenzyme A Disulfide Reductase: Two hyperthermophilic enzymes that are similar but different. In: *Flavins and Flavoproteins 2005* (Nishino, T., Miura, R. and Tanokura, M., Eds.), ARchiTect Inc., Tokyo Japan (2005).

4. Crane, E.J. III, Ward, D.E., van der Oost, J., She, Q., and Garrett, R.: Overexpression of putative NADH oxidases from the hyperthermophilic archaeons *Sulfolobus solfataricus* and *Pyrococcus horikoshii*. In *Flavins and Flavoproteins 1999* (Ghisla, S., Kroneck, P., Macheroux, P., and Sund, H. ed.), Rudolf Weber, Berlin, 281-284, (1999).

5. Crane, E.J. III, and Claiborne, A.: The role of Arg303 in the structure and mechanism of enterococcal NADH peroxidase. In *Flavins and Flavoproteins 1996* (Stevenson, K., Massey, V., Williams, C. ed.), Walter de Gruyter, New York, 773-776, (1997).

6. Claiborne, A., Crane, E.J. III, Parsonage, D., Yeh, J., Hol, W.G.J., and Vervoort, J.: NADH peroxidase from Enterococcus faecalis: Crystal structure, ^{13}C NMR analysis, and mechanism. In *Flavins and Flavoproteins 1996* (Stevenson, K., Massey, V., Williams, C.. ed.), Walter de Gruyter, New York, 731-740, (1997).

7. Claiborne, A., Ross, R.P., Ward, D., Parsonage D., and Crane, E.J. III: Flavoprotein peroxide and disulfide reductases and their roles in streptococcal oxidative metabolism. In *Flavins and Flavoproteins 1993* (Yagi, K., ed.), Walter de Gruyter, New York, 587-596, (1993).

POSTERS AND INVITED TALKS (PROFESSIONAL PRESENTATIONS)
(including posters presented by students studying with me; presenting author of multiple author presentations underlined)

1. Invited talk, "The many mechanisms of sulfur-based respiration: an ancient metabolism that continues to shape the earth today" University of California, Riverside, Department of Biochemistry, November 2009,

2. Invited talk, "The biochemistry of elemental sulfur reduction in *Shewanella*," *Shewanella* Federation, Pacific Northwest National Labs, Richland, WA, August 2007.

3. Knouf, E, Bayliss, K., McCormick D., and Crane, E.J. III, "Community analysis of a mud volcano system near the Salton Sea utilizing culture and non-culture based techniques," Gordon Conference on Archaea, Proctor Academy, Proctor, NH, August 2007.

4. Pomona College Faculty "Blue Room" talk, "Geomicrobiology or: how I learned to stop worrying and love pollution," Pomona College, Clarermont, CA, September, 2006.

5. Invited talk, "Oxidative stress in hyperthermophiles," University of Southern California, February, 2006.

6. Invited talk, "Oxidative stress in hyperthermophiles," California State University, San Francisco, October 21st, 2005.

7. Kyle M. Lancaster, Ganesh P. Devendra, E.J. Crane, "Mechanistic Swinging: Serine and Selenocysteine Mutations of the NADH Oxidase from *Pyrococcus Furiosus,*" Pfizer Undergraduate Research Symposium, Groton, CT, Friday, October 8th, 2004

8. Invited talk, "The Role of Coenzyme A disulfide reductase and small intracellular thiols in the metabolism of *Pyrococcus*," 5th International Conference on Extremophiles, Cambridge, MD, Wednesday, September 22nd, 2004.

9. Feasel, J., Lancaster, K., Dorschner, K., Ward, D and Crane, E.J. III, "The coenzyme A reductase of *Pyrococcus horikoshii*: Implications for the disulfide and redox metabolism of hyperthermophiles," Gordon Conference on Archaea, Proctor Academy, Proctor, NH, August 3rd-8th, 2003.

10. Harris, D., Ward, D., Feasel, J., Mallet, T., and Crane, E.J. III "Characterization of a thermophilic coenzyme A disulfide reductase mechanism: comparison to mesophilic and thermophilic members of the single-cysteine containing NADH oxidase family," 18th Enzyme Mechanisms conference Galveston, TX, January 4-7th 2003.

11. Steele, M, Yodha, M., Kawarabayasi, and Crane, E.J. III "Purification and characterization of a putative mercuric reductase from the hyperthermophile *Aeropyrum pernix: Comparison of thermophilic and mesophilic homologoues"* 18th Enzyme Mechanisms conference Galveston, TX, January 4-7th 2003.

12. Feasel, J. and Crane, E.J. III: "The Coenzyme A disulfide reductase from *Pyrococcus*: Implications for the disulfide and redox metabolism of hyperthermophiles," Southern California Chapter of the American Chemical Society Undergraduate Research Symposium, California

Lutheran College, April 12th, 2003.

13. Dorschner, K. and Crane, E.J. III: "The Relative Sensitivity of Small Molecular Weight Thiols to Thermal Oxidation: Implications for the Redox Metabolism of Hyperthermophiles," Southern California Chapter of the American Chemical Society Undergraduate Research Symposium, California Lutheran College, April 12th, 2003.

14. Lancaster, K. and Crane, E.J. III: "Detection of Small Molecular Weight Thiols In *Pyrococcus furiosus,"* SCUR Poster Session, Pomona College, Claremont, CA, September 29th, 2003.

15. Victor, A. and Crane, E.J. III: "Purification and Characterization of a Thermophilic Mercuric Reductase from *Aeropyrum Pernix,"* SCUR Poster Session, Pomona College, Claremont, CA, September 29th, 2003.

16. Davis, C. and Crane, E.J. III: "The role of NADH oxidase in the oxidative stress response of *Pyrococcus furiosus,*" Southern California Council for Undergraduate Research, University of California, Irvine, November 15th, 2003.

17. Hummel, C. and Crane, E.J. III: "Exposure of the hyperthermophilic anaerobe *Pyrococcus furiosus* to oxygen," Southern California Council for Undergraduate Research, University of California, Irvine, November 15th, 2003.

18. Lancaster, K. and Crane, E.J. III: "Detection of Small Molecular Weight Thiols In *Pyr7ococcus furiosus,"* Southern California Council for Undergraduate Research, University of California, Irvine, November 15th, 2003.

19. Invited lecture, "The oxidative stress response of hyperthermophiles," Tokyo University of Agriculture and Technology, Tokyo, Japan, January 12th, 2002.

20. Ward, D., Donnelly, C., Mullendore, M., van der Oost, J., de Vos, W. and Crane, E.J. III: Novel hyperthermophilic flavoprotein reductases from the genus *Pyrococcus* with two-pathway mechanisms. Poster presented at 16th Enzyme Mechanisms Conference (2001).

21. Harris, D., and Crane, E.J. III: Characterization of an NADH oxidase from *Pyrococcus horikoshii*: Kinetics, substrate specificity, and quaternary structure. Invited talk at 4th annual Undergraduate Research Symposium in the Chemical and Biological Sciences, University of Maryland (2001).

22. Donnelly, C. and Crane, E.J. III: Characterization of a thermophilic NADH oxidase activity in the presence of organic solvents: A novel approach to cosolvents. Poster presented at 4th annual Undergraduate Research Symposium in the Chemical and Biological Sciences, University of Maryland (2001).

23. Mullendore, M., Ward, D., and Crane, E.J. III: Overexpression, purification and sequence analysis of a thermophilic NADH oxidase (NOX2) from *Pyrococcus horikoshii*. Poster presented at Council on Undergraduate Research "Posters on the (Capitol) Hill" symposium (2001).

24. Mullendore, M., Ward, D., and Crane, E.J. III: Overexpression, purification and sequence analysis of a thermophilic NADH oxidase (NOX2) from *Pyrococcus horikoshii*. Poster presented at Federation of American Societies for Experimental Biology Meeting (2001).

25. Mullendore, M., Ward, D., and Crane, E.J. III: Overexpression, purification and sequence analysis of a thermophilic NADH oxidase (NOX2) from *Pyrococcus horikoshii*. Talk presented National Conference on Undergraduate Research (2001).

26. Donnelly, C., Mullendore, M., Ward, D., van der Oost, J., and Crane, E.J. III: Characterization of an NAD(P)H oxidase (rNOX2*ph*) from *Pyrococcus horikoshii*. Poster presented at 3rd annual Undergraduate Research Symposium in the Chemical and Biological Sciences, University of Maryland (2000) (poster won second place in the Biochemistry and Molecular Biology Division).

27. Mullendore, M., Donnelly, C., Ward, D., van der Oost, J., and Crane, E.J. III: Overexpression, purification and kinetic analysis of a thermophilic NADH oxidase (rNOX1*pf*) from *Pyrococcus furiosus*. Poster presented at 3rd annual Undergraduate Research Symposium in the Chemical and Biological Sciences, University of Maryland (2000).

28. Mullendore, M., Ward, D., and Crane, E.J. III: Overexpression of thermophilic NADH oxidases from *Pyrococcus*. Talk presented National Conference on Undergraduate Research (2000).

29. Crane, E.J. III, Ward, D.E., van der Oost, J., She, Q., and Garrett, R.: Sequence analysis and overexpression of putative NADH oxidases from the hyperthermophilic archaeons *Sulfolobus solfataricus* and *Pyrococcus horikoshii.* Poster presented at the Thirteenth International Symposium on Flavins and Flavoproteins (1999).

30. Mullendore, M., Ward, D., and Crane, E.J. III: Overexpression, purification and sequence analysis of a thermophilic NADH oxidase (NOX2) from *Pyrococcus horikoshii*. Poster presented at 2nd annual Undergraduate Research Symposium in the Chemical and Biological Sciences, University of Maryland (1999).

31. Mayers, C. M., and Crane, E.J. III: Purification and characterization of a thermophilic NADH oxidase from *Sulfolobus shibatae*. Talk presented National Conference on Undergraduate Research (1999).

32. Crane, E.J. III, Yeh, J.I., Hol, W.G.J., and Claiborne, A.: Active site interactions which are critical for cysteine-sulfenic acid stability and reactivity. Poster presented at 16th Enzyme Mechanisms Conference (1999).

33. Baumgartner, J. and Crane, E.J. III: NADH Oxidases of the thermophilic archaeon *Sulfolobus shibatae*. Talk presented at the National Conference on Undergraduate Research (1998).

34. Crane, E.J. III, Michelson, N.M., and Pereboom, M.: From reflection to practice: How does

reflection affect our teaching. Invited talk presented at the National Council of Teachers of English Conference (1997).

35. Crane, E.J. III, Vervoort, J., and Claiborne, A.: ^{13}C NMR analysis of the cysteine-sulfenic acid redox center and active site histidine of Enterococcal NADH peroxidase. Poster presented at 15th Enzyme Mechanisms Conference (1997).

36. Crane, E.J. III, and Claiborne, A.: The Role of Arg303 in the structure and mechanism of enterococcal NADH peroxidase. Poster presented at the Twelfth International Symposium on Flavins and Flavoproteins (1996).

37. Crane, E.J. III : NMR and kinetic studies of NADH peroxidase. Talk presented at Wageningen Agricultural University (Wageningen, The Netherlands), Department of Biochemistry (1996).

38. Crane, E.J. III, Parsonage, D., Ballou D., and Claiborne , A.: Rapid kinetic studies of mutant and wild type NADH peroxidases from *Enterococcus faecalis*. Poster presented at 14th Enzyme Mechanisms Conference (1995).

39. Crane, E.J. III, Parsonage, D., Spicer L., and Claiborne, A.: Role of Histidine 10 in the catalytic mechanism of streptococcal NADH peroxidase. Poster presented at ASBMB/ACS Meeting (1993).

40. Washabaugh, M.W. and Crane, E.J. III: Single turnover studies on brewer's yeast pyruvate decarboxylase. Poster presented at 13th Enzyme Mechanisms Conference (1993).

41. Crane, E.J. III, and Washabaugh, M.W.: Retrograde aldol-type reactions involving thiamin in aqueous solution: Evidence for changes in transition state structure. Poster presented at Gordon Research Conference on Enzymes, Coenzymes and Metabolic Pathways (1992).

42. Crane, E.J. III, and Washabaugh, M.W.: General base catalysis of the cleavage of 2-(1-hydroxybenzyl)thiamin by a preassociation mechanism. Poster presented at NIEHS Training Program in Environmental Health Sciences Workshop (1990).

43. Crane, E.J. III, and Washabaugh, M.W.: General base catalysis of the cleavage of 2-(1-hydroxybenzyl)thiamin by a preassociation mechanism. Poster presented at Gordon Research Conference on Enzymes, Coenzymes and Metabolic Pathways (1990).

COLLEGE SERVICE

Salisbury University

Multiethnic Concerns Committee	1997-1998
Faculty Senate (Senator)	1997-2001
Faculty Senate Executive Committee	2000-2001
Faculty Development Committee, Senate Rep.	1997-2001
Undergraduate Research Committee	1998-1999
Undergraduate Research Committee, Cochair	2000-2002

Pomona College

Departmental Seminar coordinator/coord.	2004-2005
Medical Sciences Committee	2003-current
Chair of Chemistry Department	2008-current