

John Edward Hanson

Professor of Chemistry

Department of Chemistry
University of Puget Sound
1500 N. Warner
Tacoma, WA 98416

Birthdate: June 1, 1959

EDUCATION

1988 Ph.D. Chemistry University of California, Berkeley, CA
1981 B.A. Chemistry Whitman College, Walla Walla, WA

RESEARCH AND TEACHING EXPERIENCE

7/02 - present

Professor of Chemistry, University of Puget Sound

1/11-8/11

Sabbatical Research at the University of Puget Sound

1/04-6/04

Sabbatical Research at the University of Puget Sound

7/97 - 7/02

Associate Professor of Chemistry, University of Puget Sound

7/96 - 7/97

Sabbatical research at the University of Oregon: Synthesis of Substrates for T4 Lysozyme.

7/90 - 7/96

Assistant Professor of Chemistry, University of Puget Sound

3/88 - 7/90

Postdoctoral research at Harvard University in the lab of Don Wiley in collaboration with Jeremy Knowles, George Whitesides, and Martin Karplus. We were exploring the binding of sialic acids to influenza hemagglutinin with the eventual goal of designing tight-binding ligands that might be useful as anti-influenza agents. I was involved in synthesizing sialic acid analogs, evaluating the binding affinities of these analogs using an NMR binding assay, performing molecular mechanics calculations directed at understanding the observed binding affinities, and carrying out molecular modelling to design new ligands.

10/82 - 2/88

Graduate research at the University of California at Berkeley under the direction of Paul A. Bartlett. By using tetrahedral phosphorus as a mimic of the transition state of peptide bond hydrolysis, we were able to produce potent inhibitors of zinc and aspartic proteases. I synthesized and tested a variety of aminoalkylphosphonic acid derivatives incorporated into appropriate peptide sequences. Because of potent inhibition (up to 1 pM), relatively slow binding ($2 \times 10^5 \text{ M}^{-1}\text{s}^{-1}$), and, in one case, rapid decomposition ($t_{1/2} = 20 \text{ min}$), I was forced to develop unusual strategies for evaluating these inhibitors. This research formed the basis of my Ph.D. thesis: "Inhibitors of Zinc and Aspartic Peptidases: Peptides Containing Aminoalkylphosphonic Acid Derivatives".

6/80 - 5/81

Undergraduate research at the University of Utah under the direction of Wesley Bentrude. This research was continued during my senior year at Whitman and formed the basis of my honors thesis: "The Synthesis and Thermal Decomposition of a 1,3,2-Oxazaphosphorinane and a 1,3,2-Oxazaphospholidine".

PUBLICATIONS

Hanson, J.; Dasher, B.; Scharrer, E.; Hoyt, T. "Exploring the Stereochemistry of the Wittig Reaction: The Unexpected Influence of a Nominal Spectator Ion", *J. Chem. Educ.*, **2010**, *87*, 971-974.

Hanson, J.; Hoyt, T. "Unknown Gases: Student-Designed Experiments in the Introductory Laboratory", *J. Chem. Educ.*, **2002**, *79*, 845-846.

Bartlett, P.A.; Hanson, J.E.; Morgan, B.P.; Ellsworth, B.A., "Synthesis of Peptides with a Phosphorus-Containing Amide Bond Replacement", in *Synthesis of Peptides and Peptidomimetics*, Goodman, M., Moroder, L., and Toniolo, C., Editors, Houben-Weyl, Stuttgart (2002).

Hanson, J. "Synthesis and Use of Jacobsen's Catalyst: Enantioselective Epoxidation in the Introductory Organic Laboratory", *J. Chem. Educ.*, **2001**, *78*, 1266-1268.

Fujinaga, M.; Cherney, M.M.; Tarasova, N.I.; Bartlett, P.A.; Hanson, J.E.; James, M.N.G. "Structural Study of the Complex Between Human Pepsin and a Phosphorus-Containing Peptidic Transition-State Analog", *Acta Cryst.*, **2000**, *D56*, 272-279.

Bartlett, P.A.; Morgan, B.P.; Drewry, D.H.; Kaplan, A.P.; Hanson, J.E.; Reich, S.H.; Shea, G.T.; Telfer, S.J.; Waterman, S.C. "Mechanism- and structure-based strategies for the design of biologically active compounds", *New Methods in Drug Research*, **1995**, *4*, 1-24.

Sauter, N.K.; Hanson, J.E.; Glick, G.D.; Brown, J.H.; Crowther, R.L.; Park, S.-J.; Skehel, J.J.; Wiley, D.C., "Binding of Influenza Virus Hemagglutinin to Analogs of Its Cell-Surface Receptor, Sialic Acid: Analysis by Proton Nuclear Magnetic Resonance Spectroscopy and X-ray Crystallography", *Biochemistry*, **1992**, *31*, 9609-9621.

Hanson, J.E.; Sauter, N.K.; Skehel, J.J.; Wiley, D.C., "Proton Nuclear Magnetic Resonance Studies of the Binding of Sialosides to Intact Influenza Virus", *Virology*, **1992**, *189*, 525-533.

Fraser M.E.; Strynadka, N.C.J.; Bartlett, P.A.; Hanson, J.E.; James, M.N.G, "Crystallographic Analysis of Transition State Mimics Bound to Penicillopepsin: Phosphorus-Containing Peptide Analogues", *Biochemistry*, **1992**, *31*, 5201-5214.

Fraser, M.; Strynadka, N.; Sielecki, A.; Hanson, J.; Bartlett, P.; Gelb, M.; James, M., "Crystallographic Analyses of Peptide Inhibitors of Aspartic Proteinases", *The Peptide-Protein Bridge, Toronto, Canada* (Symposium Abstract), **1991**.

Bartlett, P.A.; Hanson, J.E.; Giannousis, P.P., "Potent Inhibition of Pepsin and Penicillopepsin by Phosphorus-Containing Peptide Analogues", *J. Org. Chem.*, **1990**, *55*, 6268-6274.

Sauter, N.K; Bednarski, M.D.; Wurzburg, B.A.; Hanson, J.E.; Whitesides, G.M.; Skehel, J.J.; Wiley, D.C., "Hemagglutinins from Two Influenza Virus Variants Bind to Sialic Acid Derivatives with Millimolar Dissociation Constants: A 500 MHz Proton Nuclear Magnetic Resonance Study", *Biochemistry*, **1989**, *28*, 8388-8396.

Hanson, J.E.; Kaplan, A.P.; Bartlett, P.A., "Phosphonate Analogs of Carboxypeptidase A Substrates are Potent Transition-State Analogue Inhibitors", *Biochemistry*, **1989**, *28*, 6294-6305.

Bartlett, P.A.; Morgan, B.P.; Drewry, D.H.; Kaplan, A.P.; Hanson, J.E.; Reich, S.H.; Shea, G.T.; Telfer, S.J.; Waterman, T.S., "Mechanism- and Structure-Derived Strategies for the Design of Biologically Active Compounds", in *Proceedings of the 4th Cyprus Conference on New Methods in Drug Research*, Makriyannis, A., ed., in press.

Bartlett, P.A.; Drewry, D.H.; Hanson, J.E.; Marlowe, C.K., "Details of the Interaction of Phosphorus-Containing Peptide Inhibitors with Thermolysin", in **Peptides: Chemistry and Biology** (*Proc. Tenth Amer. Pept. Symposium*), G.A. Marshall, ed. (ESCOM/Leiden, The Netherlands), **1988**, pp. 427-432.

Bartlett, P.A.; Marlowe, C.K.; Giannousis, P.P.; Hanson, J.E., "Phosphorus-Containing Peptide Analogs as Peptidase Inhibitors", in **Cold Spring Harbor Symposia on Quantitative Biology**, Volume LII, Cold Spring Harbor Laboratory, **1987**, pp. 83-90.

Bartlett, P.A.; Hanson, J.E.; Acher, F.; Giannousis, P.P., "Phosphorus Analogs as Peptidase Inhibitors: Aspartic Peptidases and Leucine Aminopeptidase", in **Phosphorus Chemistry of Biomolecules**, (*Proc. Intl. Symp. Phos. Chem. Directed Towards Biol.*), Bruzik, K.S. and Stec, W.J., eds. (Elsevier, Amsterdam), **1987**, pp. 429-440.

ORAL PRESENTATIONS

- 8/11 "Self-propelled Microrockets to Capture and Isolate Circulating Tumor Cells and Other Fantastic Voyages"
Summer Research Brownbag Presentation, University of Puget Sound
- 3/10 "NMR spectroscopy in nondeuterated solvents (No-D NMR): Applications in the undergraduate organic laboratory"

239th ACS National Meeting, San Francisco, CA

- 6/09 "Preparation and Use of a Chiral (salen)CoIII Catalyst: Hydrolytic Kinetic Resolution of Epoxides in the Introductory Organic Laboratory"
64th Northwest Regional Meeting of the ACS, Pacific Lutheran University
- 2/09 "From Dyes to Drugs: The Development of Modern Medicinal Chemistry"
Thompson Hall Science Seminar, University of Puget Sound
- 2/09 "The Rise and Fall and Rise and Fall of Antibiotics"
Pierce County Medical Association, Tacoma, WA
- 11/07 "The Rise and Fall and Rise and Fall of Antibiotics"
Parent's Weekend, University of Puget Sound
- 5/06 "Confronting Complexity"
University of Puget Sound Convocation
- 2/04 "The Pleasure of Figuring Things Out: Examples from Undergraduate Chemistry Labs"
Haverford College Chemistry Seminar
- 6/03 "Cultivating Colleagues in Undergraduate Chemistry Labs"
Caveat Pensionarius: A Symposium in Honor of Paul A. Bartlett
- 2/97 "Design and Synthesis of Substrates for T4 Lysozyme"
Volcano Conference in Bioorganic Chemistry
- 10/89 "Exploring the Binding of Sialic Acids to Influenza Hemagglutinin"
BIOTECH USA 1989, *Proceedings of the BIOTECH USA Conference*, 372-381.
San Francisco, CA
- 8/89 "Potent Inhibitors of Carboxypeptidase A and Thermolysin"
1989 Medicinal Chemistry Gordon Conference
Colby-Sawyer College, New London, NH
- 6/89 "Binding of Sialic Acid Derivatives to Influenza Hemagglutinin"
1989 Conference on Crystallography and Drug Design
Erice, ITALY

POSTER PRESENTATIONS

Nguyen, Jamie; Hanson, John "Synthesis of potential T4 lysozyme substrates" 241st ACS National Meeting & Exposition, Anaheim, CA, March 27-31, 2011 (CHED-1002).

Kirkpatrick, Greg; Carelli, Jordan; Martin, Mark O.; Hanson, John "His-Tag Protein Purification of the MalA enzyme from bacterial predator *Bdellovibrio bacteriovorus*" 241st ACS National Meeting & Exposition, Anaheim, CA, March 27-31, 2011 (CHED-357).

Barter, Megan Elizabeth; Hanson, John E. "Optimization of the methodology for the synthesis of phosphinate esters" 235th ACS National Meeting & Exposition, New Orleans, LA, April 6-10, 2008 (CHED-561).

Pobanz, Kelsey N.; Hanson, John E. "Total synthesis and evaluation of T4 lysozyme activity of two N-acetylmuramic acid derivatives" 235th ACS National Meeting & Exposition, New Orleans, LA, April 6-10, 2008 (CHED-510).

Drew, Shane, P.; Hanson, John E. "Synthesis of nucleoside monomers: Precursors for the preparation of phosphinate DNA" 235th ACS National Meeting & Exposition, New Orleans, LA, April 6-10, 2008 (CHED-491).

Luu, Yen Kim; Hanson, John E. "Interactions of vanadate with alcohols probed by vanadium NMR spectroscopy" 221st ACS National Meeting & Exposition, San Diego, CA, April 1-5, 2001 (CHED-447).

Lau, Kimberly S.F.; Hanson, John "Synthesis of a T4 lysozyme substrate" 221st ACS National Meeting & Exposition, San Diego, CA, April 1-5, 2001 (CHED-306).

AWARDS & GRANTS

2011	McCormick Faculty Mentor Award
2010	McCormick Faculty Mentor Award
2009	Selected as an Honorary Faculty Member of Phi Eta Sigma National Honor Society, University of Puget Sound Chapter
2007	McCormick Faculty Mentor Award
2002	Promotion to Professor
1999	UPS Teaching Award
1999	Faculty Summer Research Stipend
1996-97	John Lantz Sabbatical Award
1996	Promotion to Associate Professor with Tenure
1995	Faculty Summer Research Stipend
1991-1994	American Chemical Society – Petroleum Research Fund Grant (\$18,000) <i>Phosphonate and Vanadate Analogs of DNA: Probing the Mechanism of BamH1 endonuclease</i>

- 1990-1995 Research Corporation Cottrell College Science Grant (\$25,000)
*Phosphonate and Vanadate Analogs of DNA:
Probing the Mechanism of BamHI endonuclease*
- 1983-1986 National Science Foundation Predoctoral Fellow
- 1981 Graduation *magna cum laude* with Honors in Chemistry
- 1981 American Institute of Chemists Student Award (Outstanding senior undergraduate majoring in Chemistry at Whitman)
- 1981 Phi Beta Kappa
- 1977-1981 National Merit Scholar
- 1977-1981 Paul Garrett Scholar (Whitman)

RESEARCH STUDENTS

9/11-present	Harry Hamlin Chem 490	<i>Synthesis of Substrates for T4 Lysozyme</i>
9/11-present	Bryce Rogers Chem 390, 0.25 unit	<i>Synthesis of modified glucose analogs for studies with mal A from Bdellovibrio bacteriovorus</i>
9/11-present	Thien Vu Chem 390, 0.25 unit	<i>Optimization of methods for synthesis of nucleoside analogs</i>
5/11-present	Christine Isabella* Chem 490	<i>Exploring the substrate specificity of malA from Bdellovibrio bacteriovorus</i>
9/11-5/11	Greg Kirkpatrick Chem 490	<i>The MalA Enzyme from Bdellovibrio bacteriovorus: Expression in E. coli and TLC Analysis of Enzymatic Activity</i>
9/10-12/10	Chris Shaw Chem 390, 0.25 unit	<i>Synthesis of (S)-2-bromopropionic acid from L-alanine</i>
1/10-5/11	Jamie Nguyen* Chem 490	<i>Synthesis of a T4 Lysozyme Substrate</i>
5/10-5/11	Jordan Carelli* Chem 490	<i>Determination of a Substrate for the Predicted Bdellovibrio bacteriovorus Glycoside Hydrolase malA and Substrate-Enzyme Interaction</i>
1/10-5/11	Jinhee Lee* Chem 490	<i>Synthesis of nucleoside analogs for preparation of phosphinate DNA</i>

5/10-9/10	Andrew Clarke*	<i>Isolation of the gull-repulsive compound in the sea star <i>Henricia Spp.</i></i>
1/10-5/10	Sun Han Chem 390, 2 x 0.25 unit	<i>Low Temperature NMR of Wittig intermediates</i>
1/10-5/10 9/11-present	Jeremy Tempkin Chem 390, 0.25 unit; Chem 490	<i>Molecular dynamics simulations of T4 Lysozyme and its binding to substrates</i>
8/09-12/09	Rollie Williams Chem 390, 0.25 unit	<i>A Spartan-based computational exploration of the Wittig reaction and its transition states</i>
9/09-5/10	Travis Mendel Chem 490	<i>Preliminary Studies in Isolating Chemical Deterrent(s) from the Blood Star (<i>Henricia leviuscula</i>) Using a Gull Taste Preference Bioassay</i>
5/09-8/09	Nathan Parnell*	<i>Synthesis and Analysis of a T4 Lysozyme Substrate</i>
9/08-5/09	Stacy Maynard Chem 490	<i>Synthesis of the Monomer Precursor to Phosphinate DNA</i>
5/07-5/09	Steven Melhorn** Chem 490	<i>Synthesis of a Phosphonate Nucleotide Analog with a 3'-Phosphorus-Carbon Bond</i>
6/08-5/09	Christina Donnelly*	<i>Exploring the Substrate Specificity of T4 Lysozyme</i>
5/07-5/08	Shane Drew* Chem 490	<i>Synthesis of a Phosphinate DNA Analog</i>
5/07-5/08	Kelsey Pobanz* Chem 490	<i>Synthesis of Possible Substrates for the T4 Lysozyme</i>
5/07-5/08	Megan Barter* Chem 490	<i>Methodology for the Synthesis of Phosphinate Esters</i>
9/06 - 5/07	Christine Vanos	<i>Synthesis of a T4 Lysozyme Substrate</i>
6/05 - 4/06	David Grochowski*	<i>Synthesis of a T4 Lysozyme Substrate</i>
5/04 - 5/05	Kristen Bor*	<i>Synthesis of a Phosphonate DNA Analog</i>
9/03 - 5/04	Aubrey Hendricks	<i>Towards the Synthesis of a Phosphonate Analog of 2'-Deoxyguanosine-3'-Phosphate</i>
5/03 - 5/04	Sabrina Hong*	<i>Synthesis of a T4 Lysozyme Substrate</i>
9/02-7/03	Glenna Anderson	<i>Towards the Synthesis of a Phosphonate Analog of 2'-Deoxyguanosine-3'-Phosphate</i>
6/02-5/03	Katie Keaton*	<i>Phosphorus-Carbon Bond Forming Reactions: Toward the Synthesis of Phosphinate DNA</i>

9/01-5/02	Mark Allen	<i>Towards the Synthesis of a Phosphonate Analog of 2'-Deoxyguanosine-3'-Phosphate</i>
6/01-5/02	Melissa Quinney*	<i>Phosphorus-Carbon Bond Forming Reactions: Toward the Synthesis of a Phosphinate DNA</i>
6/00-5/01	Kim Lau*	<i>Synthesis of a Substrate for T4 Lysozyme</i>
9/00-5/01	Yen "Kim" Luu	<i>⁵¹V-NMR Studies of the Interactions of Vanadate: Alcohols Diols, and Vanadate DNA Analogs</i>
5/99-5/01	Rhiannon Iha**	<i>Investigation of the 2'-Deoxygenation in the Synthesis of 2'-O-Deoxyguanosine-3'-Phosphate</i>
9/99-5/00	Susannah Hochstein	<i>Preliminary Studies Toward the Synthesis of a Substrate for T4 Lysozyme</i>
5/99-5/00	Sol Cantwell*	<i>⁵¹V-NMR studies of the Interaction of Vanadate with Alcohols and Diols</i>
9/97-5/98	Tom Edwards	<i>Towards the Synthesis of a Phosphonate Analog of 2'-Deoxyguanosine-3'-Phosphate</i>
9/96-5/97	Kristina Schneider	<i>Investigating Methods for the Removal of the 2'-Hydroxyl during the Synthesis of Phosphonate Analog of 2'-Deoxyguanosine-3'-Phosphate</i>
5/95-5/96	Jason Schuman*	<i>Synthesis of a Substrate for T4 Lysozyme</i>
5/95-8/95	Matt Shupe*	<i>Model Studies on Vanadate Interactions: The interaction of vanadate with various DNA model systems (Summer Research Only)</i>

5/94-5/96	Erik Wallace**	<i>Synthesis of the Phosphonate Analog of 2'-Deoxyguanosine-3'-phosphate: Optimizatin Using Diethyl and Diisopropyl Phosphonate Analog Intermediates</i>
5/94-5/96	Alan Burningham*	<i>Synthesis of Phosphinate Esters from Hypophosphorous Acid and Application to the Synthesis of a Phosphinate DNA Analog</i>
5/93-5/94	Judy Fankhauser*	<i>Investigation of the Base Addition Reaction in the Synthesis of Phosphonate Analog of 2'-Deoxyguanosine-3'-Phosphate</i>
5/93-5/94	Jesse Ryan*	<i>Synthesis of Phosphinate DNA</i>
5/92-5/94	Miriam Chong**	<i>Vanadate DNA Analogs</i>
5/91-5/93	Kim Stigers**	<i>Synthesis of a Key Intermediate in the Construction of 3'Phosphonate Analogue of 2'-Deoxyguanosine-3'-phosphate</i>

* An asterisk is included for each summer of research.

PROFESSIONAL ORGANIZATIONS

American Chemical Society
Council on Undergraduate Research