

## CURRICULUM VITAE

### 1. Paul Gregory Williard

Professor  
Chemistry Department, Brown University

### 2. Home Address:

### 3. Education

B.S. Bucknell University 1972  
M.S. Bucknell University 1972  
M.Phil. Columbia University 1974  
Ph.D. Columbia University 1976 (with Gilbert Stork)

Dissertation Topic: Investigation of a Novel Carbon-Carbon Bond Forming Reaction.

### 4. Professional Appointments

National Institute of Health Trainee, MIT; 1976-1978  
NIH Postdoctoral Research Associate, MIT: 1976-1979, (with G. Büchi)  
Brown University: Assistant Professor, 1979-1985  
Jr. Faculty Sabbatical Leave, Spring, 1984  
Associate Professor, 1986-1992  
Chair, Dept. of Chemistry, 1999-2005  
Professor, 1992-present  
Fellowships: Japanese Society for the Promotion of Science, 2013  
J William Fulbright Scholar, spring AY 15-16

### 5. Completed Research:

#### Publications:

Peer Reviewed Journal:

1. Heine, H. W.; Williard, P. G.; Hoye, T. R. "Synthesis and reactions of some (nitroaryl)diaziridines". *J. Org. Chem.* **1972**, *37*(19), 2980-3.
2. Heine, H. W.; Hoye, T. R.; Williard, P. G.; Hoye, R. C. "Diaziridines. II. Addition of diaziridines to electrophilic acetylenes". *J. Org. Chem.* **1973**, *38*(17), 2984-8.
3. Stork, G.; Williard, P. G. "Five- and six-membered-ring formation from olefinic  $\alpha,\beta$ -epoxy ketones and hydrazine". *J. Am. Chem. Soc.* **1977**, *99*(21), 7067-8.
4. Büchi, G.; Williard, P. G. "The total synthesis of mollicellin A". *Heterocycles* **1978**, 11437-42.
5. Williard, P. G.; Fryhle, C. B. "Boron trihalide-methyl sulfide complexes as convenient reagents for dealkylation of aryl ethers". *Tetrahedron Lett.* **1980**, *21*(39), 3731-4.

6. Williard, P. G.; Grab, L. A.; Springer, J. P. "N-aryl sulfonyl hydrazimides: hydrazones of esters". *Tetrahedron Lett.* **1981**, 22(29), 2731-4.
7. Chung, Y. K.; Williard, P. G.; Sweigart, D. A. "Addition of Grignard reagents and ketone enolates to the arene in (arene)manganese tricarbonyl cations". *Organometallics* **1982**, 1(8), 1053-6.
8. Williard, P. G.; Grab, L. A.; De Laszlo, S. E. "Synthesis of costatolide, a halogenated monoterpenoid from the red alga *Plocamium costatum*". *J. Org. Chem.* **1983**, 48(7), 1123-5.
9. Jong, T. T.; Williard, P. G.; Porwoll, J. P. "Total synthesis and x-ray structure determination of cyanobacterin". *J. Org. Chem.* **1984**, 49(4), 735-6.
10. Polt, R. L.; Stork, G.; Carpenter, G. B.; Williard, P. G. "X-ray crystal structure of N-(2-lithiocyclohexenyl)-N,N',N'-trimethyl-1,3-propanediamine: a pentavalent lithium?". *J. Am. Chem. Soc.* **1984**, 106(15), 4276-7.
11. Williard, P. G.; De Laszlo, S. E. "Total synthesis of ( $\mp$ )-dysidin, a marine metabolite containing an N-acyl-O-methyltetramic acid". *J. Org. Chem.* **1984**, 49(19), 3489-93.
12. Williard, P. G.; Grab, L. A. "Total synthesis of costatone: a monoterpene from the red seaweed: *Plocamium costatum*". *Tetrahedron Lett.* **1984**, 25(44), 5009-12.
13. De Laszlo, S. E.; Williard, P. G. "Total synthesis of (+)-demethyldysidenin and (-)-demethylisodysidenin, hexachlorinated amino acids from the marine sponge *Dysidea herbacea*. Assignment of absolute stereochemistry". *J. Am. Chem. Soc.* **1985**, 107(1), 199-203.
14. Honig, E. D.; Meng, Q. J.; Robinson, W. T.; Williard, P. G.; Sweigart, D. A. "Nucleophilic addition to coordinated cycloheptatriene: a mechanistic and structural study". *Organometallics* **1985**, 4(5), 871-7.
15. Koh, J. J.; Lee, W. H.; Williard, P. G.; Risen, W. M., Jr. "The PtP(C<sub>6</sub>H<sub>11</sub>)<sub>3</sub>(C<sub>2</sub>H<sub>4</sub>)<sub>2</sub> mediated activation of aldehyde carbon-hydrogen bonds via chelate-assisted oxidative addition reactions". *J. Organomet. Chem.* **1985**, 284(3), 409-19.
16. Tanis, S. P.; Abdallah, Y. M.; Williard, P. G. "Selective rearrangements of 4a,5-epoxides of 4,4-dimethyl-1,2,3,4,6,8a-hexahydronaphthalenes". *Tetrahedron Lett.* **1985**, 26(31), 3651-4.
17. Williard, P. G.; Carpenter, G. B. "X-ray crystal structure of an unsolvated lithium enolate anion". *J. Am. Chem. Soc.* **1985**, 107(11), 3345-6.
18. Williard, P. G.; De Laszlo, S. E. "Total synthesis of halogenated monoterpene marine natural products via the Diels-Alder reaction". *J. Org. Chem.* **1985**, 50(20), 3738-49.
19. Williard, P. G.; Salvino, J. M. "X-ray crystal structure of a lithium aldolate - a tetrameric aggregate". *Tetrahedron Lett.* **1985**, 26(33), 3931-4.

20. Lee, K. S.; Williard, P. G.; Suggs, J. W. "Structure of the simple lithium chelate (LiCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>NMe<sub>2</sub>)<sub>4</sub>". *J. Organomet. Chem.* **1986**, 299(3), 311-17.
21. Stevens, R. V.; Beaulieu, N.; Chan, W. H.; Daniewski, A. R.; Takeda, T.; Waldner, A.; Williard, P. G.; Zutter, U. "Studies on the synthesis of vitamin B<sub>12</sub>. 4". *J. Am. Chem. Soc.* **1986**, 108(5), 1039-49.
22. Suggs, J. W.; Wovkulich, M. J.; Williard, P. G.; Lee, K. S. "Reactivity patterns in the reactions of [Rh(CO)2Cl]<sub>2</sub> with chelating ketones". *J. Organomet. Chem.* **1986**, 307(1), 71-82.
23. Williard, P. G.; Carpenter, G. B. "X-ray crystal structures of lithium, sodium, and potassium enolates of pinacolone". *J. Am. Chem. Soc.* **1986**, 108(3), 462-8.
24. Williard, P. G.; De Laszlo, S. E.; Carpenter, G. B.; Demoulini, S. E. "( $\mp$ )-E-6,6,6-trichloro-3-methoxy-5-methyl-2-hexenoic acid". *Acta Crystallogr., Sect. C: Cryst. Struct. Commun.* **1986**, C42(5), 589-91.
25. Williard, P. G.; De Laszlo, S. E.; Grab, L. A.; Salvino, J. M. "Total syntheses of halogenated marine natural products". *Stud. Org. Chem. (Amsterdam)* **1986**, 26(*New Trends Nat. Prod. Chem. 1986*), 585-605.
26. Williard, P. G.; Salvino, J. M. "X-ray crystal structure determination of a bromomagnesium ketone enolate". *J. Chem. Soc., Chem. Commun.* **1986**(2), 153-4.
27. Winkler, J. D.; Hey, J. P.; Williard, P. G. "Inside-outside stereoisomerism: the synthesis of trans-bicyclo[5.3.1]undecane-11-one". *J. Am. Chem. Soc.* **1986**, 108(20), 6425-7.
28. Williard, P. G.; Hintze, M. J. "The first structural characterization of a dimeric lithium ketone enolate-LDA complex". *J. Am. Chem. Soc.* **1987**, 109(18), 5539-41.
29. Winkler, J. D.; Henegar, K. E.; Williard, P. G. "Inside-outside stereoisomerism. II. Synthesis of the carbocyclic ring system of the ingenane diterpenes via the intramolecular dioxolenone photocycloaddition". *J. Am. Chem. Soc.* **1987**, 109(9), 2850-1.
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35. Williard, P. G. "Structure of potassium hexamethyldisilazide toluene solvate". *Acta Crystallogr., Sect. C: Cryst. Struct. Commun.* **1988**, *C44(2)*, 270-2.
36. Williard, P. G.; Sohng, J. K.; Cane, D. E. "The x-ray crystal structure of pentalenolactone F methyl ester (epi-pentalenolactone F)". *J. Antibiot.* **1988**, *41(1)*, 130-3.
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38. Winkler, J. D.; Hey, J. P.; Williard, P. G. "Inside-outside stereoisomerism. III. The synthesis of trans-bicyclo[4.3.1]decan-10-one". *Tetrahedron Lett.* **1988**, *29(37)*, 4691-4.
39. Fraenkel, G.; Winchester, W. R.; Williard, P. G. "Lithio(diphenylphosphino)methane-tetramethylethylenediamine: crystal structure and NMR studies of a coordinatively unsaturated, monomeric organolithium". *Organometallics* **1989**, *8(10)*, 2308-11.
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41. O'Connor, S. J.; Williard, P. G. "Strategy for the synthesis of the C10-C19 portion of amphinolide-A". *Tetrahedron Lett.* **1989**, *30(35)*, 4637-40.
42. Williard, P. G.; MacEwan, G. J. "Crystal structure of a unique aggregate containing lithium and potassium cations, ketone enolate, and tert-butoxide". *J. Am. Chem. Soc.* **1989**, *111(19)*, 7671-2.
43. Williard, P. G.; Wrensford, G. "Synthesis and x-ray crystal structure of 3,5-dibromo-6-hydroxy-6-methyl-2-heptanone". *Synth. Commun.* **1989**, *19(13-14)*, 2501-4.
44. Winkler, J. D.; Muller, C. L.; Hey, J. P.; Ogilvie, R. J.; Haddad, N.; Squattrito, P. J.; Williard, P. G. "The effect of chromophore transposition on the stereochemical outcome of the intramolecular dioxenone photocycloaddition reaction". *Tetrahedron Lett.* **1989**, *30(39)*, 5211-14.
45. Xu, Y. C.; Challener, C. A.; Dragisich, V.; Brandvold, T. A.; Peterson, G. A.; Wulff, W. D.; Williard, P. G. "The generation of 2-vinylcyclopentene-1,3-diones via a five-component coupling in the coordination sphere of chromium". *J. Am. Chem. Soc.* **1989**, *111(18)*, 7269-71.

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48. Wrensford, G.; Grab, L. A.; Salvino, J. M.; Williard, P. G. "Synthesis of 3-bromo-6-ethenyltetrahydro-2,2,6-trimethyl-2H-pyran". *Tetrahedron Lett.* **1990**, *31*(30), 4257-60.
49. Kim, Y. J.; Bernstein, M. P.; Roth, A. S. G.; Romesberg, F. E.; Williard, P. G.; Fuller, D. J.; Harrison, A. T.; Collum, D. B. "Structure and reactivity of lithium diisopropylamide (LDA) in hydrocarbon solutions. Formation of unsolvated ketone, ester, and carboxamide enolates". *J. Org. Chem.* **1991**, *56*(14), 4435-9.
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53. Williard, P. G.; Nichols, M. A. "Structural characterization of mixed alkali metal bis(trimethylsilyl)amide bases". *J. Am. Chem. Soc.* **1991**, *113*(25), 9671-3.
54. Winkler, J. D.; Hong, B. C.; Hey, J. P.; Williard, P. G. "Inside-outside stereoisomerism. 5. Synthesis and reactivity of trans-bicyclo[n.3.1] alkanones prepared via the intramolecular photocycloaddition of dioxenones". *J. Am. Chem. Soc.* **1991**, *113*(23), 8839-46.
55. Bernstein, M. P.; Romesberg, F. E.; Fuller, D. J.; Harrison, A. T.; Collum, D. B.; Liu, Q. Y.; Williard, P. G. "Structure and reactivity of lithium diisopropylamide in the presence of N,N,N',N'-tetramethylethylenediamine". *J. Am. Chem. Soc.* **1992**, *114*(13), 5100-10.
56. Cane, D. E.; Sohng, J. K.; Williard, P. G. "Isolation and structure determination of pentalenolactones A, B, D, and F". *J. Org. Chem.* **1992**, *57*(3), 844-51.
57. Dittami, J. P.; Nie, X. Y.; Nie, H.; Ramanathan, H.; Buntel, C.; Rigatti, S.; Bordner, J.; Decosta, D. L.; Williard, P. "Tandem photocyclization-intramolecular addition reactions of aryl vinyl sulfides. Observation of a novel [2 + 2] cycloaddition-allylic sulfide rearrangement". *J. Org. Chem.* **1992**, *57*(4), 1151-8.

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157. Guang, J.; Hopson, R.; Williard, P. G. "Diffusion Coefficient-Formula Weight (D-FW)

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166. Tai, O.; Hopson, R.; Williard, P. G. "Aggregation and Solvation of n-Butyllithium". *Org. Lett.* **2017**, *19*, (15), 3966-3969.
167. Berton, M.; Mello, R.; Williard, P. G.; Gonzalez-Nunez, M. E. "Reactivity of Lithium  $\beta$ -Ketocarboxylates: The Role of Lithium Salts". *J. Am. Chem. Soc.* **2017**, *139*, (48), 17414-17420.

**Books:**

1. "Total Synthesis of Marine Natural Products" in *New Trends Natural Product Chemistry*, Atta-ur Rahman & Philip LeQuesne (eds.), Springer-Verlag (Berlin), 1986
2. "Carbanions of Alkali and Alkaline Earth Cations: (i) Synthesis and Structural Characterization" in *Comprehensive Organic Synthesis*, Vol 1, BV. M. Trost, I. Fleming, S. L. Scheriber (eds.), Pergamon Press (Oxford), 1991, pp. 1-48.

**Invited Lectures:**

November, 1979	Southeastern Massachusetts University
December, 1979	University of Lowell
April, 1982	American Chemical Society, Middle Atlantic Regional Meeting, (paper)
June, 1982	American Chemical Society, Northeastern Regional Meeting, (paper)
July, 1982	Gordon Research Conference, Natural Products Chemistry, (short talk)
April, 1982	Bucknell University
December, 1982	Mount Holyoke College
March, 1983	Bucknell University
April, 1983	Syracuse University
	Clark University
July, 1983	Gordon Research Conference, Natural Products Chemistry (short talk)
September, 1983	American Chemical Society, National Meeting
	Boston University
	University of Rhode Island
October, 1983	Imperial Chemical Industries, Wilmington, DE
January, 1983	Upjohn, Inc.
	Michigan State University
	Iowa State University
February, 1984	Gordon Research Conference, Marine Natural Products Chemistry (Plenary Lecturer)
	University of California, Santa Barbara
March, 1984	Suntory Institute for Bioorganic Chemistry, Osaka, JAPAN
	Osaka City University, Osaka, JAPAN

April, 1984	Hokkaido University, Sapporo, JAPAN Tohoku University, Sendai, JAPAN Keio University, Tokyo, JAPAN Tokyo Institute of Technology, Tokyo, JAPAN Nagoya University, Nagoya, JAPAN
June, 1984	Gordon Research Conference, Stereochemistry (poster)
July, 1984	NSF Workshop on Organic Synthesis
August, 1984	XIII International Union of Crystallography, Assembly and Congress, Hamburg, FRG (poster) V Int. Conference on Org. Synthesis, IUPAC, Freiburg i. Breisgau, FRG, (poster)
October, 1984	University of New Hampshire
July, 1985	Gordon Research Conference, Natural Products (poster)
November, 1985	International Symposium on Organic Chemistry of Medicinal Natural Products, IUPAC, Shanghai, CHINA, Suntony Institute for Bioorganic Chemistry, Osaka, JAPAN
December, 1985	City University of New York, City College Columbia University
January, 1986	Eidgenossische Technische Hochschule, Zurich, SWITZERLAND H.E.J. Research Institute of Chemistry, University of Karachi, Karachi, PAKISTAN Imperial College, London, ENGLAND Sandoz, Inc., Vienna, AUSTRIA Cambridge University, Cambridge, ENGLAND
April, 1986	Washington State University University of California, Riverside
July, 1986	Gordon Research Conference, Stereochemistry (poster)
August, 1986	IUPAC, Int. Conference on Organic Synthesis, MOSCOW, USSR
October, 1986	University of Massachusetts State University of New York at Albany General Electric Res. Laboratories, Schenectedy, NY University of Connecticut
November, 1986	Rohm & Haas Research Labs Villanova University University of Pennsylvania
March, 1987	University of Chicago
April, 1987	American Chemical Society, Denver CO Ohio State University



August, 1987	XIV International Union of Crystallography, Assembly & Congress, Perth, Western Australia (poster)
	VIII, Royal Australian Chemical Institute Meeting, Sydney, Australia, (poster)
October, 1987	Cornell University
	Merck, Sharp & Dohme
December, 1987	Worcester Polytechnic Institute
February, 1988	University of Rochester
June, 1988	IUPAC, International Conference on Organic Synthesis Nancy, France (poster)
August, 1988	EUCHEM Conference on Alkali Metals in Organic Synthesis (poster)
January, 1989	ACS RI Section Meeting, Providence, RI
July, 1989	Carbanion Symposium, Ottawa, Canada (poster)
December, 1989	International Conference of the Pacific Basin Chemical Societies Meeting, Honolulu, HI
February, 1990	Rensselaer Polytechnic Institute, Troy, NY
March, 1990	Drexel University, Philadelphia, PA
	Smith, Kline & Beecham Pharmaceuticals Res. Lab. Philadelphia, PA
November, 1990	Southeastern Mass University, New Bedford, MA
March, 1991	Carleton College, Northfield, MN
March, 1991	University of Minnesota, Minneapolis, MN
August, 1991	Organometallic Chemistry for Organic Synthesis Conference, University of Utrecht, Utercht, Netherlands
May, 1992	NSF Workshop on Organometallic Chemistry, Salt Lake City, UT
June, 1992	IUPAC Carbanion Symposium, Gallipoli, Italy
August, 1992	ACS National Meeting, invited speaker, Washington, DC
December, 1992	ICI Americas, Wilmington, DE
February, 1993	University of Connecticut
July, 1993	Bucknell University, Merck Lecturer
November, 1993	University of Rhode Island

February, 1994	Pfizer Research Labs, Groton CN
June 1994	Gordon Research Conference on Stereochemistry, Newport, RI
September, 1994	Zeneca Pharmaceuticals, Aldersly Edge, England University of Cambridge, England, Int. Symposium on Alkali & Alkaline Earth Metals, (invited speaker)
August, 1995	Fourth International Symposium on Carbanion Chemistry, Boulder, CO
March, 1996	Columbia University, New York, NY
August, 1996	XVII International Union of Crystallography, Assembly & Congress, Seattle, WA (poster)
October, 1997	2nd Int. Conference on Alkali & Alkaline Earth Metals (invited speaker) Heinrich Heine Universität, Erlangen, Germany
October, 1997	Universität Düsseldorf, Düsseldorf, Germany
November, 1997	The Ohio State University
December, 1997	University of Massachusetts, Dartmouth, North Dartmouth, MA
May, 1998	Univeristy of Rhode Island, South Kingston, RI
February, 1999	Bucknell University, Lewisburg, PA Rhône-Poulenc-Rohr, King of Prussia, PA
August, 1999	XVIII International Union of Crystallography, Ammenbly & Congress, Glasgow, Scotland (poster) Strathclyde University, Glasgow, Scotland
October, 1999	Wilkes College, Wilkes Barre, PA University of Scranton, Wilkes Barre, PA
April, 2000	Clark Univeristy, Worcester, MA
November, 2000	John Carrol Univeristy, Cleveland, OH
May, 2002	Univ of Bari, Bari Ltaly
June, 2002	DeLuca Symposium on Vitamin D, Taos, New Mexico
May, 2003	Jackman Symposium, Penn State Univeristy, State College, PA
July, 2003	17 <sup>th</sup> Int Conf. On Vitamin D, Maastricht, Netherlands
September, 2003	3 <sup>rd</sup> Int. Conf. On Alakali Metals and Alkaline Earths, Wurzburg, Germany
October, 2003	University of Pennsylvania, Philadelphia, PA; Bucknell Univ. Lewisburg, PA

August, 2004	Invited Lecturer & Instructor, NSF Summer School – X-ray Crystallography for Organic Chemists, UC San Diego, La Jolla, CA
September, 2004	Univ. of New Hampshire, Durham, NH
October, 2004	Colby College, Waterville, ME
November, 2004	Göteborg Univeristy, Göteborg, Sweden
April, 2005	Univ. of North Carolina, Charlotte, NC
August, 2005	Invited Lecturer & Instructor, ACS Summer School – X-ray Crystallography for Organic Chemists, UC San Diego, La Jolla, CA
September, 2005	University of Notre Dame, South Bend, IN
December, 2005	Pacificchem Meeting, (invited speaker), Honolulu, HI Astra Pharmaceuticals, Wilmington, DE
November, 2006	University of Massachusetts, Dartmouth, MA
June, 2007	Invited Lecturer, 8 <sup>th</sup> International Symposium on Organometallics in Organic Synthesis, University of Wisconsin, Madison, WI
August, 2007	Invited Lecturer & Instructor, ACS Summer School – X-ray Crystallography for Organic Chemists, UC San Diego, La Jolla, CA
November, 2008	Dartmouth University, Hanover, NH Colgate University, Hamilton, NY Villanova University, Villanova, PA
January, 2009	Southern Methodist University, Dallas, TX
February, 2009	NSF/NIH Workshop, Washington, DC
October, 2009	Middlebury College, Middlebury, VT
November, 2009	Lafayette College, Easton, PA
May, 2010	Invited Lecturer, Recent Adv. in Organolithium Chemistry, Dept. of Pharmacy, Univ. Bari, Bari, Italy Dept. of Chemistry, Univ. Bari, Bari, Italy
September, 2010	Invited lecturer, Symposium Honoring Prof. Gideon Fraenkel, Dept. of Chemistry, Ohio State Univ., Columbus, OH
November, 2010	Invited lecturer, Symposium on New NMR Methodology, Pfizer, Inc. Groton, CT
December, 2010	Invited lecturer two symposia talks, PACIFICHEM Meeting, Symposium on Group I metals & Symposium on Carbanions, Honolulu, HI
February, 2011	Brandeis Univ., Waltham, MA
October, 2011	Univ. of Arkansas, Fayetteville, Arkansas
December, 2011	Sorbonne, Paris VI, Université Pierre & Marie Curie, Paris, France Université de Rouen, Rouen, France

Université de Caen Basse Normandie, Caen, France

September, 2012 Bucknell Univ., Lewisburg, PA

October, 2012 Practical Applications of NMR in Industry (PANIC), California  
Separation Science Society (CASSS) Conference, Schaumburg, IL  
(invited speaker)

November, 2012 Univ. of Pennsylvania, Philadelphia, PA

September, 2013 10<sup>th</sup> International Conference on Carbanion Chemistry, Kyoto, Japan  
(invited lecturer)  
Kyoto University, Kyoto, Japan  
Kyushu University, Fukuoka, Japan

October, 2013 Tohoku University, Sendai, Japan  
Tokyo Institute of Technology, Tokyo, Japan  
University of Tokyo, Tokyo, Japan

June, 2014 Beijing University, Beijing, China  
Sichuan University, Chengdu, China

October, 2014 Bucknell University, Lewisburg, PA  
Muhlenberg College, Easton, PA

July, 2015 Beijing University, Beijing, China  
Sichuan University, Chengdu, China

September, 2015 Phila. Organic Chemists Club, Philadelphia, PA  
Univ. Pennsylvania, Philadelphia, PA  
Susquehanna Univ., Selinsgrove, PA

November, 2015 Univ. of Scranton, Scranton, PA

December, 2015 International PACIFICHEM Meeting, Honolulu, HI

February, 2016 Univ. of Strasbourg, Strasbourg, France  
Gorges-August-Universität, Göttingen, Germany  
Technical University of Dortmund, Dortmund, Germany

March, 2016 Univ. of Paris VI, Paris, France  
Univ. of Caen, Caen, France

April, 2016 Marseilles-Aix University, Marseilles, France  
Institut de Recherche et Chimie Organique Fine, ICROF, Mont St.  
Aignan, France

May, 2016 University of Bordeaux, Bordeaux, France  
University of Toulouse, Toulouse, France  
University of Nantes, Nantes, France

June, 2016 Ecole Polytechnique, Palaiseau, France  
University of Paris Sud, Orsay, France  
Institut de Chimie des Substances Naturelles, University Paris-  
Saclay, Gif-sur-Yvette, France

July, 2016 11<sup>th</sup> International Conference on Carbanion Chemistry, Rouen, France

### Research Presentations at National American Chemical Society (ACS) Meetings

1. Sun, C.; Williard, P. G., Solid- and solution-state structure of a mixed aggregate containing Li-enolate of 3-pentanone and a chiral Li-amide ligand derived from N-isopropyl-O-TIPS-valinol. *Book of Abstracts, 219th ACS National Meeting, San Francisco, CA, March 26-30, 2000* **2000**, ORGN-709.
2. Williard, P. G.; Jacobson, M. A., Structural studies of lithiated silyl-allylamines. *Book of Abstracts, 219th ACS National Meeting, San Francisco, CA, March 26-30, 2000* **2000**, ORGN-550.
3. Sun, C.; Williard, P. G., Structure studies and applications of mixed aggregates containing alkylolithiums and chiral lithium amides derived from (S)-N-isopropyl-O-protected-valinol. *Book of Abstracts, 219th ACS National Meeting, San Francisco, CA, March 26-30, 2000* **2000**, ORGN-009.
4. Yu, Y.; Williard, P. G., Progress toward the total synthesis of Amphidinolide-A. *Abstracts of Papers, 221st ACS National Meeting, San Diego, CA, United States, April 1-5, 2001* **2001**, ORGN-580.
5. Jacobson, M. A.; Williard, P. G., Synthesis of 2,3-disubstituted pyrroles via 3,N-dilithio-N-silylallylamines. *Abstracts of Papers, 221st ACS National Meeting, San Diego, CA, United States, April 1-5, 2001* **2001**, ORGN-333.
6. Keresztes, I.; Williard, P. G., Gradient selected fully coupled NMR spectroscopy: A new and general method for  $^1\text{H}/^7\text{Li}$  chemical shift correlation in organolithium aggregates. *Abstracts of Papers, 221st ACS National Meeting, San Diego, CA, United States, April 1-5, 2001* **2001**, ORGN-332.
7. Keresztes, I.; Williard, P. G., Mixed aggregation of common organolithium reagents: A gradient selected fully coupled NMR spectroscopy study. *Abstracts of Papers, 221st ACS National Meeting, San Diego, CA, United States, April 1-5, 2001* **2001**, ORGN-317.
8. Wu, K.; Williard, P. G., Enantioselective aldol reaction using soluble-polymer supported chiral lithium amide. *Abstracts of Papers, 229th ACS National Meeting, San Diego, CA, United States, March 13-17, 2005* **2005**, ORGN-780.
9. Liu, J.; Williard, P. G., Lithium amide-catalyzed enantioselective addition of alkyl lithiums. *Abstracts of Papers, 229th ACS National Meeting, San Diego, CA, United States, March 13-17, 2005* **2005**, ORGN-520.

10. Ma, L.; Williard, P. G., Polymer-supported chiral lithium amide bases: Synthesis and application in asymmetric organic reactions. *Abstracts of Papers, 229th ACS National Meeting, San Diego, CA, United States, March 13-17, 2005* **2005**, ORGN-198.
11. Turteltaub, J. L. S.; Williard, P. G., Synthesis of a novel analog of the C,D ring and side chain of 1a, 25-dihydroxyvitamin D<sub>3</sub>. *Abstracts of Papers, 230th ACS National Meeting, Washington, DC, United States, Aug. 28-Sept. 1, 2005* **2005**, ORGN-189.
12. Li, Deyu; Liu, Jia; Williard, Paul G.. Diffusion-ordered NMR spectroscopy (DOSY) studies of mixed alkali metal cation hexamethyldisilazide bases. *Abstracts of Papers, 232nd ACS National Meeting, San Francisco, CA, United States, Sept. 10-14, 2006* (**2006**), ORGN-166
13. Turteltaub, Joanna L. S.; Williard, Paul. G.. Investigation of a facile intramolecular N→C acyl migration. *Abstracts of Papers, 232nd ACS National Meeting, San Francisco, CA, United States, Sept. 10-14, 2006* (**2006**), ORGN-533.
14. Liu, Jia; Li, Deyu; Williard, Paul G.. NMR studies on mixed trimer complex of n-BuLi and chiral lithium amide. *Abstracts of Papers, 232nd ACS National Meeting, San Francisco, CA, United States, Sept. 10-14, 2006* (**2006**), ORGN-172.
15. Li, D.; Liu, J.; Williard, P. G., <sup>13</sup>C DOSY studies of solution structures of lithium diisopropylamide and alkali hexamethyldisilazides. *Abstracts of Papers, 233rd ACS National Meeting, Chicago, IL, United States, March 25-29, 2007* **2007**, INOR-1018.
16. Li, D.; Liu, J.; Williard, P. G., Multinuclear DOSY studies of organometallic systems. *Abstracts of Papers, 233rd ACS National Meeting, Chicago, IL, United States, March 25-29, 2007* **2007**, ORGN-282.
17. Ma, L.; Williard, P. G., Asymmetric enolization of prochiral cyclic ketones by polymer-supported lithium amides. *Abstracts of Papers, 233rd ACS National Meeting, Chicago, IL, United States, March 25-29, 2007* **2007**, ORGN-471.
18. Ma, L.; Williard, P. G., Generation of boron enolates from diamineborane chlorides and ketones. *Abstracts of Papers, 233rd ACS National Meeting, Chicago, IL, United States, March 25-29, 2007* **2007**, ORGN-779.
19. Ma, L.; Hopson, R.; Williard, P. G., Structural studies of boron enolates by X-ray crystallography and DOSY NMR spectroscopy. *Abstracts of Papers, 234th ACS National Meeting, Boston, MA, United States, August 19-23, 2007* **2007**, ORGN-023.
20. Rella, M. R.; Williard, P. G., Selective oxidation of linear and cyclic peptides by dioxiranes. *Abstracts of Papers, 234th ACS National Meeting, Boston, MA, United States, August 19-23, 2007* **2007**, ORGN-140.
21. Li, D.; Li, W.; Williard, P. G., Internal-standard system of multinuclear diffusion-ordered NMR spectroscopy and its applications in identification of organometallic complexes.

*Abstracts of Papers, 234th ACS National Meeting, Boston, MA, United States, August 19-23, 2007* **2007**, ORGN-851.

22. Li, W.; Li, D.; Williard, P. G., New [1,2]-Wittig rearrangement: Methodology and application. *Abstracts of Papers, 234th ACS National Meeting, Boston, MA, United States, August 19-23, 2007* **2007**, ORGN-871.
23. Rella, M. R.; Williard, P. G., Selective hydroxylation of di- and tri-peptides bearing alkyl side chains by methyl(trifluoromethyl)dioxirane. *Abstracts of Papers, 234th ACS National Meeting, Boston, MA, United States, August 19-23, 2007* **2007**, ORGN-919.
24. Li, D.; Li, W.; Williard, P. G., Solution-state structures of chiral mixed aggregates by Diffusion-Ordered NMR spectroscopy. *Abstracts of Papers, 235th ACS National Meeting, New Orleans, LA, United States, April 6-10, 2008* **2008**, ORGN-097.
25. Li, D.; Li, W.; Williard, P. G., Lithium diisopropylamide and lithium hexamethyldisilazide aggregation state studies by Diffusion-Ordered NMR spectroscopy. *Abstracts of Papers, 235th ACS National Meeting, New Orleans, LA, United States, April 6-10, 2008* **2008**, INOR-736.
26. Kagan, G. L.; Li, D.; Williard, P. G. "Solution state structures of potassium bis(trimethylsilyl)amide (KHMDs) and their relative reactivity". *Abstracts of Papers, 237th ACS National Meeting, Salt Lake City, UT, United States, March 22-26, 2009* **2009** ORGN-521.
27. Li, W.; Kagan, G. L.; Hopson, R.; Williard, P. G. "Aggregation studies of organolithium complexes by 6Li DOSY, 1H DOSY and 1H, 6Li HOESY NMR methods". *Abstract of Papers, 238th ACS National Meeting, Washington, DC, United States, August 16-20, 2009* **2009** INOR-857.
28. Li, W.; Kagan, G. L.; Hopson, R.; Williard, P. G. "Lithium hexamethyldisilazide (LiHMDS)/donor molecule complexes: 1H and 13C DOSY studies". *Abstract of Papers, 238th ACS National Meeting, Washington, DC, United States, August 16-20, 2009* **2009** INOR-626.
29. Li, W.; Kagan, G.; Hopson, R.; Williard, P. "Facile formula weight analysis by diffusion-ordered NMR spectroscopy in physically separated diffusion systems". *Abstracts of Papers, 240th ACS National Meeting, Boston, MA, United States, August 22-26, 2010* **2010** ANYL-109.
30. Kagan, G. L.; Socha, A. M.; Li, W.; Hopson, R.; Sello, J. K.; Williard, P. G. "Diffusion coefficient-formula weight correlation analysis via DOSY NMR to examine acylglyceride mixtures and biodiesel production". *Abstracts of Papers, 240th ACS National Meeting, Boston, MA, United States, August 22-26, 2010* **2010** FUEL-127.
31. Su, C.; Williard, P.; Guang, J. "Investigation of the aggregation states of chiral lithium amides using DOSY NMR". *Abstracts of Papers, 243rd ACS National Meeting & Exposition, San Diego, CA, United States, March 25-29, 2012* **2012** ORGN-892.
32. Su, C.; Williard, P.; Hopson, R. "Development of C13 labeled internal references for 13C diffusion-

ordered NMR spectroscopy (DOSY) with diffusion coefficient-formula weight (D-FW) analysis and its application in determining the FW of organolithium complexes in solution state". *Abstracts of Papers, 245th ACS National Meeting & Exposition, New Orleans, LA, United States, April 7-11, 2013* **2013** ORGN-619.

33. Guang, J.; Hopson, R.; Su, C.; Williard, P. "Referenced diffusion coefficient - formula weight (D-FW) analysis of <sup>2</sup>H diffusion-ordered NMR spectroscopy (DOSY) and applications to organometallic complexes". *Abstracts of Papers, 245th ACS National Meeting & Exposition, New Orleans, LA, United States, April 7-11, 2013* **2013** ORGN-561.
34. Liu, C.; Williard, P. G. "Solid and solution state characterization of lithium enolates of amides". *Abstracts of Papers, 250th ACS National Meeting & Exposition, Boston, MA, United States, August 16-20, 2015* **2015** ORGN-184.
35. Guang, J.; Williard, P. G. "Solution and X-ray crystal structures of lithium pinacolone enolate solvated by HMPA". *Abstracts of Papers, 249th ACS National Meeting & Exposition, Denver, CO, United States, March 22-26, 2015* **2015** ORGN-366.
36. Chen, J.; Zhang, Q.-F.; Williard, P. G.; Wang, L.-S. "Toward synthesis of the Au<sub>20</sub> pyramid and other atom-precise gold nanoclusters using phosphine ligands". *Abstracts of Papers, 251st ACS National Meeting & Exposition, San Diego, CA, United States, March 13-17, 2016* **2016** COLL-302.
37. Tai, O.; Williard, P. "Application of DOSY NMR: Solution state characterizations of lithium hexamethyldisilazide (LiHMDS) complexes with ethereal ligands and determination of equilibrium binding constants". *Abstracts of Papers, 252nd ACS National Meeting & Exposition, Philadelphia, PA, United States, August 21-25, 2016* **2016** ORGN-181.
38. Zhang, Q.-F.; Williard, P. G.; Wang, L.-S. "Synthesis of diphosphine-protected Au<sub>22</sub>(C<sub>28</sub>H<sub>28</sub>OP<sub>2</sub>)<sub>7</sub> nanocluster". *Abstracts of Papers, 251st ACS National Meeting & Exposition, San Diego, CA, United States, March 13-17, 2016* **2016** COLL-205.
39. Tai, O.; Williard, P. G. "Ether solvated lithium pinacolone enolates: Solution and solid state characterizations". *Abstracts of Papers, 253rd ACS National Meeting & Exposition, San Francisco, CA, United States, April 2-6, 2017* **2017** ORGN-364.

**6. Research in progress:**

- a) Development of new and useful asymmetric synthetic methodology and NMR techniques
- b) Development of new chiral polymeric reagents
- c) X-ray diffraction analysis of anions and reactive intermediates



d) Asymmetric selective oxidation peptides with dioxiranes

**7. Service:**

**To the University:**

Department Committees

Departmental Library Representative, 1979-80  
Departmental Safety Committee, 1984-88  
Chemistry Department Colloquia, 1988-89  
Departmental Liquid Nitrogen Use Committee, 1991, 1992  
Departmental Organic Seminars, 1988, 1993  
Departmental Computer Committee, 1983-1997  
Departmental Admissions Committee, 1980-83; 1994-1999; chair 2014-2016  
Departmental Lecturer Search Committee, chair, 2008-2009  
Department 2<sup>nd</sup> year Grad. Student Eval Committee, 2002-present  
Department Original Research Proposal Committee, 2007-present  
Department Junior Faculty Mentor, 2009-2014  
Departmental Instrument Committee - chairman 1997- 1999, 2010-2013  
Department Faculty Search Committee – 2015-2016

University Committees

University Committee on Academic Standing, 1980-83  
University Library Committee, 1984-88  
University Library Committee Chairman, 1987-88  
Chemistry Department Chairman 1999-2005, 2016-present  
University Safety Committee, 1987-88, 2002-2005  
Committee on Medical Faculty Reappointment & Tenure (CMFA) 1996-99, 2006-09, 2014-2017

**Faculty advising:**

Freshman Advisor:

AY 1982-83  
AY 1983-84  
AY 1984-85  
AY 1986-87  
AY 1987-88  
AY 1987-89  
AY 2001-02  
AY 2003-04

AY 2004-05  
AY 2008-09 (six students)  
AY 2009-10 (six students)  
AY 2010-11(six students)  
AY 2011-12 (four students: Kevin Kim, Nathan Kingston, Emily Longman, Elizabeth McGinn)  
AY 2012-13 (five students: Jovita Byemerwa, Brittney Gonzalez, James Ninia, Ellise Sharpe, Terrence Sinnot)  
AY 2014-2015 (four students: Ameyo Attila, Amy Lin, Colette Toal, Joshaya Trotman)  
AY 2015-16 (five students)  
AY 2016-17 (four students: Richard Hage, Michael Kearney, Nathan McDermott, Claire Schlaikjer, Miranda Villaneuva)  
AY 2017-18 (five students: William Andersen, Julia Johnston, Suhye Park, Zachary Schapire, Nathan Sinai)

CAP Program: Fall, 1983

Sophomore Advisor:

AY 1995-1996  
AY 1996-1897  
AY 2009-10 (eight students)  
AY 2010-11 (six students)  
AY 2011-12 (five students: David Caianiello, Julie Diamond, Sarah Durney, Mauricio Pinilla, Ellen Richardson)  
AY 2012-13 (four students: Kevin Kim, Sally Kim, Nathan Kingston, Emily Longman)  
AY 2013-14 (five students: Jovita Byemerwa, Brittany Gonzalez, James Nina, Ellise Sharpe, Terrance Sinnott)  
AY 2015-16 (three students: Ameyo Attila, Amy Lin, Colette Toal)  
AY 2016-17 (four students)  
AY 2017-18 (five students: Richard Hage, Michael Kearney, Jeffery Kennan, Nathan McDermott, Claire Schlaikjer, Miranda Villaneuva)

### **Outside the University:**

Fulbright Senior Research Fellowship Area Review Committee – France & Portugal – 2017-present

National Institutes of Health Special Emphasis Study Section Reviewer, June 2005; October 2005; Jan 2006; June 2006; Oct 2006; Nov 2006; June 2007; May 2008; October 2009; Aptil 2010, Jan 2011, \*June 2012

National Institutes of Health Cancer Biology-Immunology

Contracts Review Committee, 1992  
National Institutes of Health Developmental Therapeutics  
Study Section, 1988-92  
National Cancer Institute - Special Site Visit Review  
Committee, 1990, 1999, 2000, 2001, 2004,  
American Cancer Society, Medicinal Chemistry Study  
Section, 1989, 1991  
National Institutes of Health Ad Hoc Study Section, March  
1982, April 1983, November 1983, November 1987, September 2002,  
September, 2004  
National American Cancer Society Personnel Review Committee C,  
Committee, 1993-1996, 2006  
National American Cancer Society Medicinal & Drug Development Review  
Committee, 1996-1999; Committee Chairman 1997-1999  
Technical Reviewer for: J. Am. Chem. Soc., J. Org.  
Chemistry, Tetrahedron Lett., J. Chem. Research,  
Acta Cryst. Sect. C, National Science Foundation, National Institutes of Health,  
Journal of the Chemical Society, Pakistan Chemical Society, American  
Chemical Society, Petroleum Research Fund, Organometallics,  
Canadian J. Chem., Organic Letters

Book Reviewer for: J. Pharm. Sci., Acta Crystallographia, J. Am. Chem. Soc.,  
Software review for J. Amer. Chem. Soc.

## **8. Academic Honors:**

Gertrude H. Deppen Scholarship, 1968-72  
Phi Lambda Upsilon, 1969  
Phi Beta Kappa, Bucknell University, 1971  
ACS Susquehanna Valley Section Award, 1972  
University Faculty Fellow, Columbia University, 1972-73  
Sigma Xi, 1973  
George B. Pegram, Distinguished Fellow, Columbia University, 1976  
National Institutes of Health Postdoctoral Fellow, 1977-79  
Visiting Scientist Suntory Institute for Bioorganic Chemistry,  
Osaka, Japan, 1984  
National Institutes of Health, Research Career Development Award, 1988-93  
Vitamin D Research Group Award, 1998  
Japanese Society for the Promotion of Science, Senior Fellowship, 2013  
\*J William Fulbright Fellowship, Research Scholar, Univ. Rouen, France, 2015-16

## **Grants: (funded)**

\*NSF Research Award, 2015-2018  
 NSF Research Award, 2011-2014  
 Supplemental NSF Equipment (NMR) Award, 2012  
 NSF Research Award, 2007-2010  
 NIH Public Health Service Grant (R01, sole PI), 1986-2007  
 NSF Research Award, 2002-2005  
 NIH Shared Instrumentation Grant (co-PI), 1997 & 2000  
 Rhone-Poulenc-Rohr, Post-Doctoral Research Support, 1998-2000  
 Zeneca, Inc., Scientific Research Fellowship & Academic Industrial Collaboration, 1994-1998  
 National Acad. of Sciences/Eastern European Proj. Dev., 1991  
 NIH- Shared Instrumentation Grant (PI) , 1991-1992  
 NIH Research Career Development Award, July, 1988-1993  
 NSF Travel Grant, 8/84, 11/85, 8/91  
 Biomedical Research Support Grant, 6/79, 6/80, 10/80, 3/82,  
 11/83, 5/88, 5/91  
 American Cancer Society Institutional Subgrant, 8/79, 9/82  
 American Chemical Society, Type G, 10/80  
 Research Corporation, 1/80

## 9. Teaching:

### **Courses taught:** (enrollments in parentheses)

1979-80	Chemistry 242 and 11 (lecture)
1980-81	Chemistry 12 (lecture) and 243
1981-82	Chemistry 242 and 11 (lecture)
1982-83	Chemistry 12 (lab) and 11(lecture)
1983-84	Chemistry 12 (lecture) and junior faculty sabbatical
1984-85	Chemistry 12 (lecture)
1985-86	Chemistry 12 lab, Chemistry 243
1986-87	Chemistry 12 lab, Chemistry 243
1987-88	Chemistry 242, 36, (lecture)
1988-89	Chemistry 242, 241
1989-90	RCDA (no teaching required)
1990-91	Chemistry 242, 297, 298 (RCDA)
1991-92	Chemistry 242, 297, 298 (RCDA)
1992-93	Chemistry 243, 297, 298 (RCDA)
1993-94	Chemistry 36, 243, 197, 297, 298
1994-95	Chemistry 221 & (faculty sabbatical)
1995-96	Chemistry 25 lab, 145, 297, 298
1996-97	Chemistry 25 lab, 145, 297, 298
1997-98	Chemistry 26 lab & (faculty sabbatical)
1998-99	Chemistry 25 (lecture) & Chemistry 243
1999-00	Chemistry 242 & (Dept. Chair)
2000-01	Chemistry 243 & (Dept. Chair)
2001-02	Chemistry 242 & 243 (Dept. Chair)
2002-03	Chemistry 243 (Dept. Chair)

2003-04	Chemistry 35 (Dept. Chair)
2004-05	Chemistry 35 lab (Dept. Chair)
2005-06	(no courses assigned – faculty sabbatical)
2006-07	Chemistry 156a, 156b
2007-08	Chemistry 156c, 243
2008-09	Chemistry 1560c, 0080b, 2430, 0980, 0990, 2980, 2990
2009-10	Chemistry 1560b, 0080b, 1970, 1980, 2430, 2970, 2980
2010-11	Chemistry 0080, 0970, 2420, 2210, 2980, 2990
2011-12	Chemistry 0080(11), 2420(8), 1970(1), 1980(1), 2980(3), 2990(2),(faculty sabbatical – spring 2012)
2012-13	Chemistry 0080(9), 0097(1), 1560(?), 2420(11), 2980(2), 2990(2)
2013-14	Chemistry 1560(14), 2420(4), 2980(4), 2990(4)
2014-15	Chemistry 0080(8), 0350(180), 2420(8), 2980(3), 2990(3)
2015-16	Chemistry 1560(4), 1980(1), 2420(4), 2980(3)
2016-17	Chemistry 1560(6), 2420(8), 2980(5)

6 M.S. Students Completed: June 1987, June 1989, June 1991, June 1994, June 2006, May 2017

23 Ph.D. Students Completed: September 1983; June 1984 (2);  
December 1985; October, 1987; June, 1989  
December 1989, July 1993, May 1997, December 1997, January, 2001  
January 2004 (2), January 2007, July 2007, August 2007, October 2007,  
October, 2008, January 2011, September 2013, May 2015, April 2017 (2),  
August 2017 (1)

Ph.D. Candidates (as of 12/31/17): two (2) (Huan Pang,, Quingyu Ye)

10. **Personal hobbies: athletics and woodworking (18<sup>th</sup> century furniture reproduction)**

Certified Marathons completed:

Cape Cod; Nov 1987; New York City; Nov 1988, Nov 1992; Rhode Island; Oct 1989;  
Boston; Apr 1990; Honolulu; Dec 2010, Dec 2015

11. **Updated:** January, 2018