Matthew Brichacek – *Curriculum Vitae*

University of Maine, Department of Chemistry
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Professional Experience:

2014-Present **University of Maine,** Orono Maine
Assistant Professor, Department of Chemistry

2010-2014 **University of Illinois at Urbana-Champaign, Urbana, Illinois**
Postdoctoral Fellow
Advisor: Professor Paul Hergenrother
NIH/NIGMS- Ruth L. Kirschstein National Research Service Award (F32)
- Conducted the chemical synthesis of poly(ADP-ribose) an the important post-translational modification and signaling molecule
- Developed an efficient and rapid method for the construction of pyrophosphate linkages
- Identified a stereoselective 1,2-*cis* glycosylation with ribofuranose glycosyl donors and acceptors

Education:

2005-2010 **Cornell University, Ithaca, New York**
Ph.D. Chemistry & M.S. Chemistry
Advisor: Professor Jón T. Njarðarson
NIH/NIGMS - Chemistry Biology Interface Training Program
Dissertation: New Methods for the Synthesis of Oxygen, Nitrogen, and Sulfur Containing Heterocycles
- Discovered a stereoseletive ring expansion of vinylaziridines and vinyloxiranes to produce 2,5-dihydropyrroles and 2,5-dihydrofurans
- Completed total synthesis of anticancer natural products (+)-goniothalesdiol and (±)-varitriol
- Assisted synthetic approaches to inside-out [9.3.1] bicyclic core of hypoestoxide and [3.3.1] bridged bicyclic core of Guttiferone G
GPA: 4.1/4.3

2001-2005 **University of Minnesota Duluth, Duluth, Minnesota**
B.S. Chemistry & B.S. Biochemistry and Molecular Biology
Advisor: Professor Robert M. Carlson
Summa Cum Laude & Departmental Honors
Senior Thesis: Synthesis of β-Substituted δ-Lactones from Dihydropyran
- Explored the utility of O,S-stabilized carbanions in organic synthesis
GPA: 3.9/4.0

Publications:

13. M. J. Lambrecht, M. Brichacek, P. J. Hergenrother "Controlled Enzymatic Synthesis of Homogeneous ADP-Ribose Oligomers" *J. Am. Chem. Soc*. Submitted.

12. M. J. Lambrecht*, M. Brichacek*, E. Barkauskaite, A. Ariza, I. Ahel, P. J. Hergenrother "Synthesis of Dimeric ADP-Ribose and its Structure with Human Poly(ADP-Ribose) Glycohydrolase" *J. Am. Chem. Soc.* **2015**, *137,* 3558-3564. *Equal Contribution

11. N. A. McGrath, M. Brichacek "Trifluoroperacetic Acid" *Encyclopedia of Reagents for Organic Synthesis* **2012**, John Wiley & Sons Ltd.

10. F. Li, D. Calabrese, M. Brichacek, I. Lin, J. T. Njardarson "Efficient Synthesis of Thiopyrans Using a Sulfur-Enabled Anionic Cascade" *Angew. Chem. Int. Ed.* **2012**, *51*, 1938-1941.

9. M. Brichacek, M. N. Villalobos, A. Plichta, J. T. Njardarson "Stereospecific Ring Expansion of Chiral Vinyl Aziridines" *Org. Lett.* **2011**, *13*, 1110-1113.

8. N. A. McGrath, J. R. Binner, G. Markopoulos, M. Brichacek, J. T. Njardarson "An Efficient Oxidative Dearomatization-Radical Cyclization Approach to Symmetrically Substituted Bicyclic Guttiferone Natural Products" *Chem. Commun.* **2010**, *47*, 209-211.

7. N. A. McGrath, M. Brichacek, J. T. Njardarson "A Graphical Journey of Innovative Organic Architectures That Have Improved Our Lives" *J. Chem. Ed.* **2010**, *87*, 1348-1349.

6. M. Brichacek, L. A. Batory, N. A. McGrath, J. T. Njardarson "The Strategic Marriage of Method and Motif. Total Synthesis of Varitriol" *Tetrahedron* **2010**, *66*, 4832-4840.

5. M. Brichacek, L. A. Batory, J. T. Njardarson "Stereoselective Ring Expansion of Vinyl Oxiranes. Mechanistic Insights and Natural Product Total Synthesis" *Angew. Chemie. Int. Ed.* **2010**, *49*, 1648-1651.

4. M. Brichacek, J. T. Njardarson "Creative approaches towards the synthesis of 2,5-dihydro-furans, thiophenes, and pyrroles. One method does not fit all!" *Org. Biomol. Chem.* **2009**, *7*, 1761-1770.

3. N. A. McGrath, C. A. Lee, H. Araki, M. Brichacek, J. T. Njardarson "An Efficient Substrate-Controlled Approach Towards Hypoestoxide, a Member of a Family of Diterpenoid Natural Products with an Inside-Out [9.3.1] Bicyclic Core." *Angew. Chemie, Int. Ed.* **2008**, *47*, 9450-9453.

2. M. Brichacek, D. Lee, J. T. Njardarson "Lewis Acid Catalyzed [1,3]-Sigmatropic Rearrangement of Vinyl Aziridines" *Org. Lett.* **2008**, *10*, 5023-5026.

1. M. P. Brichacek, R. M. Carlson "Dihydropyran as a Template for Lactone Synthesis" *Synthetic Commun.* **2007**, *37*, 3541-3549.

Patents:

1. Njardarson, J.; Batory, L.; Brichacek, M.; Bauer, R.; Rogers, E. Production of 2,5-Dihydrofurans and Analogous Compounds. U.S. Patent 20090131691, 2009. WO 2007/108999, 2007. China 101448807, 2009.

Teaching Experience:

Instructor University of Maine

Spring 2017	Structure and Mechanism in Biological Chemistry (CHY 431 & CHY 531) Enrollment: 31 *Examination of biosynthetic pathways, structure and function of enzymes including metalloenzymes, methods of structure determination and synthetic pathway elucidation, mechanisms of enzyme-catalyzed reactions.*
Fall 2016	Majoring in Chemistry (CHY 105) - Enrollment: 18 *Introduces students to the faculty, students, facilities and resources central to their major in chemistry. Topics covered include requirements and advising for the major, library resources, research laboratories and projects, and the special expertise of the faculty.*
Spring 2016	Structure and Mechanism in Biological Chemistry (CHY 431 & CHY 531) Enrollment: 29 *Examination of biosynthetic pathways, structure and function of enzymes including metalloenzymes, methods of structure determination and synthetic pathway elucidation, mechanisms of enzyme-catalyzed reactions.*
Fall 2015	Theoretical Organic Chemistry (CHY 556) - Enrollment: 9 *Includes topics in electronic theory and reaction mechanisms.*
Fall 2014	Intermediate Organic Chemistry (CHY 555) - Enrollment: 8 *Detailed Study of the preparation of complex organic compounds and newer synthetic methods.*

Graduate Teaching Assistant Cornell University

Spring 2010	Synthetic Organic Chemistry (CHEM 6610 formerly CHEM 666) Lead Instructor: Prof. David B. Collum *A review of the techniques used to simplify and plan the synthesis of complex organic structures.*
Fall 2008	Advanced Organic Chemistry (CHEM 6650 formerly CHEM 665) Lead Instructor: Prof. Bruce Ganem *The course focuses on properties of organic compounds; stereoelectronic principles that govern their reactivity and mechanisms; reaction thermodynamics and kinetics, and applications in stereoselective synthesis, catalysis, chemical biology and materials sciences. Case studies constitute examples where fundamental chemical insights and ideas are proven key in solving challenging problems in modern biology and medicine. General emphasis is on the development of chemical and mechanistic intuition.organic structures.*
Spring 2007	Honors Experimental Chemistry I (CHEM 3010) Lead Instructor: Prof. Steve Russo *Introduction to the techniques of synthetic organic chemistry. A representative selection of the most important classes of organic reactions is explored in the first half of the semester, augmented by lectures on the*

reaction chemistry and the theory of separation and characterization techniques.

Fall 2006 Honors Organic Chemistry (CHEM 3590 formerly CHEM 359)
Lead Instructor: Prof. Jon Njardarson
The course provides an intensive introduction to organic chemistry as a solid foundation for subsequent study in the fields of chemical, biological, materials and physical sciences. Students will learn a set of important tools and concepts that will enable appreciation and powerful application of modern organic chemistry.

Spring 2006 Introduction to Organic and Biological Chemistry (CHEM 1570)
Lead Instructor: David Usher
Introduction to organic chemistry with emphasis on structure, reactivity, and mechanisms of carbon compounds relevant to the life sciences.

Fall 2005 General Chemistry (CHEM 2070 formerly CHEM 207)
Lead Instructor: Paul Chirik
Covers fundamental chemical principles, with considerable attention given to the quantitative aspects and techniques important for further work in chemistry.

Undergraduate Teaching Assistant University of Minnesota Duluth

Spring 2005 Physical Chemistry Laboratory II (Chem 4644)
Lead Instructor: Paul Siders
Laboratory program in physical chemistry, accompanying lecture.

Fall 2004 Physical Chemistry Laboratory I (Chem 4643)
Lead Instructor: Paul Siders
Laboratory program in physical chemistry, accompanying lecture.

Spring 2004 Honors Organic Chemistry Laboratory (Chem 2545)
Lead Instructor: Robert M. Carlson
Chem 2545 is the required laboratory portion of the second semester of organic chemistry that is designed primarily for chemistry majors. The laboratory emphasizes the use of modern techniques in organic structure determination (NMR, MS, GCMS, IR, Polarimetry) , the characteristic reaction chemistry of alcohols, carbonyl compounds, amines and compounds of biological importance (amino acids and carbohydrates) and the use of "microwave-enhanced" organic synthesis.

Honors and Awards:

University of Illinois at Urbana-Champaign – Department of Chemistry

2011-2013 NIH/NIGMS - Ruth L. Kirschstein National Research Service Award (F32)
2011 Campus nominee: L. A. VFW Cancer Research Postdoctoral Fellowship

Cornell University – Department of Chemistry and Chemical Biology

2007 Bayer Teaching Excellence Award
2007 NIH/NIGMS - Chemistry Biology Interface Training Grant

University of Minnesota Duluth

2005 Casmir Ilenda Undergraduate Research Award
2005 Outstanding Undergraduate Teaching Assistant Award
2005 Larry C. Thompson Inorganic Chemistry Award
2004 Swenson Science Foundation Scholar

2004	Hypercube Scholar Award
2004	Advanced Tutor Certification by Reading & Learning Association
2003	Outstanding Organic Chemistry Sophomore

Research Support:

2016-2010	Facile Methods and Technologies for Synthesis of Biomedically Relevant Carbohydrates (U01GM120410) *"Accelerating Translation of Glycoscience: Integration and Accessibility" is an NIH Common Fund program designed to support the development of accessible and affordable new tools and technologies for studying carbohydrates that will allow biomedical researchers to significantly advance our understanding of the roles of these complex molecules in health and disease. This program will enable investigators who might not otherwise conduct research in the glycosciences, to undertake the study of carbohydrate structure and function. {NIH Stated Purpose: RFA-RM-15-007}*
2011-2012	Ruth L. Kirschstein National Research Service Award, National Institute of Health (F32-GM099397) *The purpose of the Kirschstein-NRSA postdoctoral fellowship is to enhance the research training of promising postdoctoral candidates who have the potential to become productive, independent investigators in scientific health-related research fields relevant to the missions of the participating NIH Institutes and Centers. {NIH Stated Purpose: PA-10-110}*

Faculty Development:

October 2016	The Flipped Classroom Explained STEM Education Workshop; Prof. Cathy Snelling, University of Adelaide
February 2016	CLAS "Effective Teaching Strategies for Large Lecture Courses" workshop
October 2015	CLAS Mater Teachers Panel Discussion
June 2015	NSF CAREER Award Funding Workshop
April 2015	STEM Professional Development Session "Supporting In-Class Group Work"
March 2015	Wordpress Widgets Workshop
March 2015	DIY Website Training
December 2014	STEM Professional Development Session "Using Peer Discussion to Promote Student Participation"
October 2014	STEM Professional Development Session "Active Learning Strategies for Large Enrollment STEP Courses"
September 2014	Academic Advising Workshop (FERPA, Transfer Credits, Tutor Program)
September 2014	NIH Webinar– Fundamentals of the Grants Process
August 2014	iPad Apps for teaching in your classroom
July 2014	Optimizing Media in WordPress
October 2014	Promotion and Tenure Workshop
September 2014	Peer Committee Letters Workshop

Service:

March 2017	Maine State Science Fair Judge (Scholarship Committee)
January 2017-Present	UMaine Health Professions Committee
October 2016	Undergraduated Responsible Conduct of Research Facilitator
April 2016	UMaine Student Research Symposium Judge
March 2016	Maine State Science Fair Judge (Microbiology)
April 2015	UMaine CUGR Annual Showcase Judge
April 2015	UMaine Grad Expo Physical Sciences Judge
March 2015	Maine State Science Fair Judge (Chemistry, Physics, & Mathematics)
February 2015	CUGR Center Responsible Conduct of Research Facilitator

Outreach:

June 2015	Mad Science Outreach: Bangor Parks and Recreation
May 2015	4-H@UMaine: Connect Kids to Campus Outreach (Polymers All Around Us!)
2010	Encouraging Tomorrows Chemists Program, University of Illinois U-C
2008-2009	Top 200 Pharmaceutical Products by Worldwide Sales (IMS Data)
2006-2010	Top 200 Brand-Name Drugs by Sales Poster
2006-2010	Top 200 Generic Drugs by Sales Poster
2009	Contemporary Chemistry for Teachers Workshop Cornell Center for Materials Research, Cornell University
2008	Contemporary Chemistry for Teachers Workshop Cornell Center for Materials Research, Cornell University
2007	Research Experience for Teachers Program Cornell Center for Materials Research, Cornell University
2006	Contemporary Chemistry for Teachers Workshop Cornell Center for Materials Research, Cornell University
2003-2004	Tutoring Center University of Minnesota Duluth

Selected Conferences/Presentations:

October 2016	UMD Chemistry Diamond Jubilee "Investigation of the Chemistry and Biology of EM2487" Duluth, Minnesota
June 28, 2016	NIH Common Fund Glycoscience Program "Transformative Glycosylation Methods: Towards the Solid Phase Synthesis of Oligosaccharides" Washington D.C.
March 2014	University of Alaska Fairbanks
December 2013	North Carolina State University
December 2013	University of California, Santa Cruz
November 2013	Kansas State University
November 2013	University of Florida
July 2009	Cornell University Graduate Student Summer Seminar Series
January 2009	Cornell University CBI Student Seminar
November 2007	Cornell University CBI Student Seminar
May 2005	University of Minnesota Duluth Annual Research Symposium
August 2004	University of Minnesota Duluth SURP Poster Fair

Mentoring:

University of Maine

Primary Research Advisor

Dates	Student	Type
09/2016 - Present	Alexander Flannery	Undergraduate Student (Chemistry)
10/2016 - Present	Catherine Tufts	Undergraduate Student (Chemistry)
07/2016 – 12/2016	Nathan Yankowsky	Undergraduate Student
01/2016 - Present	Ahmed Numan	Graduate Student
01/2016 - Present	Ealin Patel	Graduate Student
06/2016 – 08/2016	Andrew Moreira	High School Student
06/2015 – 08/2016	Anne Yu	Undergraduate Student
05/2015 – 08/2016	Elias Pasquerillo	Honors Undergraduate Student (Chemistry)
01/2015 - Present	Sudeera Kamburugamuwa	Graduate Student
01/2015 - Present	Thamrongsak Cheewawisuttichai	Graduate Student
10/2014 - Present	Vincent Digiovanni	Undergraduate Student
10/2014 – 05/2016	Summer Streitfeld	Undergraduate Student

Member of Dissertation Committee

Dates Advised	Student	Advisor	Type
03/2017 – Present	Shyam Pokhrel	Bruce	Graduate Student (Ph.D.)
02/2017 - Present	Mohsen Farshad	Rasaiah	Graduate Student (Ph.D.)
01/2017 - Present	Aaron Nicholas	Patterson	Graduate Student (Ph.D.)
11/2016 – 12/2016	Ryan Dutil	Bruce	Undergraduate Student (Chemistry)
11/2016 – Present	Robert Arthur	Patterson	Graduate Student (Ph.D.)
09/2016 -01/2017	Michael Flanders	Gramlich	Undergraduate Student (Chemistry)
08/2016 – Present	Nelson Elberts	Gramlich	Graduate Student (Ph.D.)
08/2016 - Present	Thomas McOscar	Gramlich	Graduate Student (M.S.)
08/2016 - Present	Anushka Vihanage	Gramlich	Graduate Student (Ph.D.)
06/2016 - Present	Stanley Bessey	Bruce	Graduate Student (Ph.D.)
06/2016 - Present	Hathaithep Senkum	Gramlich	Graduate Student (Ph.D.)
06/2016 – Present	Melissa Chisholm	Cole/Fort	Graduate Student (Ph.D.)
06/2015 - Present	Sabrina Sultana	Tripp	Graduate Student (Ph.D.)
02/2015 - 12/2015	Nina Caputo	Patterson	Honors Undergraduate Student (Chemistry)
06/2015 - Present	HyeWeon Hwang	Cole-Fort	Graduate Student (Ph.D.)
08/2014 - Present	Nayereh Dadoo	Gramlich	Graduate Student (Ph.D.)

Funding

Current Funding Support:

1. Research Project - Cooperative Agreements (U01) (RFA: Facile Methods and Technologies for Synthesis of Biomedically Relevant Carbohydrates)
   Title: Transformative Methods for the Solid Phase Synthesis of Oligosaccharides
   Role: Principal Investigator Submitted: 10/15/2015 Total Funds Requested: $1,224,982

2. University of Maine Center for Undergraduate Research Fall Fellowship
   Title: Investigation of the Chemistry and Biology of EM2487
   Role: Principal Investigator Submitted: 10/14/2016 Total Funds Awarded: $1,000

3. University of Maine Center for Undergraduate Research Fall Fellowship
   Title: Synthesis of Carbohydrate Chains
   Role: Principal Investigator Submitted: 10/14/2016 Total Funds Awarded: $1,000

Completed Funding Support:

1. University of Maine Center for Undergraduate Research Fall Fellowship
   Title: New approach to the treatment of type II diabetes using inhibitors based on the Acarviostatin family of natural products
   Role: Principal Investigator Submitted: 10/15/2014 Total Funds Awarded: $1,000

2. University of Maine Aging Research and Technologies Seed Grant Program
   Title: Evaluating Neuromelanin's Role in Neurodegenerative Disorders using Synthetic Fragments
   Role: Principal Investigator Submitted: 04/10/2015 Total Funds Requested: $17,286

3. University of Maine Center for Undergraduate Research Fall Fellowship
   Title: Investigating Neuromelanin's Role in Neurodegenerative Diseases Using Synthetic Fragments
   Role: Principal Investigator Submitted: 10/16/2015 Total Funds Awarded: $1,000