

# CURRICULUM VITAE



Caren Freil Meyers, Ph.D.

September 2012

## DEMOGRAPHIC AND PERSONAL INFORMATION

### Current Appointments:

Assistant Professor  
Department of Pharmacology and Molecular Sciences  
Department of Oncology (secondary)  
The Johns Hopkins University School of Medicine

### Personal Data:

Dept. of Pharmacology and Molecular Sciences  
WBSB 307B  
725 N. Wolfe Street  
Baltimore, MD 21205  
Phone: 410-502-4807  
Fax: 410-955-3023  
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### Education and Training:

- 1994, B.S., Michigan Technological University, Organic Chemistry
- 1996, M.S., University of Rochester, Organic Chemistry
- 1999, Ph.D., University of Rochester, Organic Chemistry
- 1999-2001, Postdoctoral Fellow, Purdue University, Teaching/Research in Organic Chemistry
- 2001-2005, Postdoctoral Fellow, Harvard Medical School, Biochemistry/Chemical Biology

### Professional Experience:

2005-current Assistant Professor, Pharmacology and Molecular Sciences,  
Johns Hopkins University School of Medicine

2005-current Faculty member, Biochemistry, Cellular and Molecular Biology  
Graduate Program, Johns Hopkins University School of Medicine

2005-current Faculty member, Chemical Biology Interface Graduate Program,  
Johns Hopkins University

2005-current	Faculty member, Anti-Cancer Drug Development (ACDD) Training Program, Johns Hopkins University School of Medicine
2009-current	Faculty member, Sidney Kimmel Comprehensive Cancer Center, JHUSOM
2009-current	Assistant Professor, Department of Oncology, Johns Hopkins University School of Medicine

## RESEARCH ACTIVITIES

### Peer-reviewed original research articles:

1. **Freel Meyers C.L.** and Borch R.F. Activation mechanisms of nucleoside phosphoramidate prodrugs. *J. Med. Chem.* 2000; 43:4319-4327. PMID: 11063626
2. **Freel Meyers C.L.**; Hong L.; Joswig C. and Borch R.F. Synthesis and biological activity of novel 5-fluoro-2'-deoxyuridine phosphoramidate prodrugs. *J. Med. Chem.* 2000; 43:4313-4318. PMID: 11063625
3. **Freel Meyers C.L.**, Borch R.F. A novel method for the preparation of nucleoside diphosphates. *Org. Lett.* 2001; 3:3765-3768. PMID: 11700133
4. **Freel Meyers C.L.**, Borch R.F. Novel method for the immobilization of nucleotides. *Org. Lett.* 2003; 5:341-4. PMID: 12556187
5. **Freel Meyers C.L.**; Oberthür M.; Anderson J.W.; Kahne D.; Walsh C.T. Initial characterization of novobiocin acid noviosyl transferase activity of NovM in biosynthesis of the antibiotic novobiocin. *Biochemistry* 2003; 42:4179-89. PMID: 12680772
6. Jakimowicz, P.; **Freel Meyers, C.L.**; Walsh, C.T.; Buttner, M.; Lawson, D.M. Crystallization and preliminary X-ray studies on the putative dTDP sugar epimerase NovW from the novobiocin biosynthetic cluster of *Streptomyces spheroides*. *Acta. Crystallogr. D Biol. Crystallogr.* 2003; 59:1507-9. PMID: 12876368
7. **Freel Meyers C.L.**; Oberthür M.; Xu H.; Heide L.; Kahne D.; Walsh C.T. Characterization of NovP and NovN: Completion of novobiocin biosynthesis by sequential tailoring of the noviosyl ring. *Angew. Chem. Int. Ed. Engl.* 2004; 43:67-70. PMID: 14694473
8. Wu W, **Freel Meyers C.L.**; Borch R.F. A novel method for the preparation of nucleoside triphosphates from activated nucleoside phosphoramidates. *Org. Lett.* 2004; 6:2257-60. PMID: 15200334
9. **Freel Meyers C.L.**; Oberthür M.; Heide L.; Kahne D.; Walsh C.T. Assembly of Dimeric Variants of Coumermycins by Tandem Action of the Four Biosynthetic Enzymes CouL, CouM, CouP and NovN. *Biochemistry* 2004; 43:15022-15036. PMID: 15554710

10. Pacholec M.; **Freel Meyers C.L.**; Oberthür M.; Heide L.; Kahne D.; Walsh C.T. Kinetic Characterization of the Aminocoumarin Ligase SimL from the Simocyclinone Pathway and Elongation of SimL Products by NovM, P, N from the Novobiocin Pathway. *Biochemistry* 2005; 44:4949-4956. PMID: 15779922
11. Tello, M.; Jakimowicz, P.; Errey, J.C; **Freel Meyers, C.L.**; Walsh, C.T.; Buttner, M.; Lawson, D.M.; Field, R.A. Characterisation of Streptomyces spheroides NovW and revision of its functional assignment to a dTDP-6-deoxy-D-xylo-4-hexulose 3-epimerase, *Chem. Commun.* 2006, 10, 1079-1081. PMID: 16411240
12. Jakimowicz, P.; Tello, M.; **Freel Meyers, C.L.**; Walsh, C.T.; Buttner, M.; Field, R.A.; Lawson, D.M. The 1.6-Å resolution crystal structure of NovW: A 4-keto-6-deoxy sugar epimerase from the novobiocin biosynthetic gene cluster of Streptomyces spheroides *Proteins-Structure Function and Bioinformatics* 2006, 63, 261-265 PMID: 16411240
13. Stevenson, C.E.M.; **Freel Meyers, C.L.**; Walsh, C.T.; Lawson, D.M. Crystallization and preliminary X-ray analysis of the O-methyltransferase NovP from the novobiocin-biosynthetic cluster of Streptomyces spheroides *Acta Crystallogr. Sect. F Struct. Biol. Cryst. Commun.* 2007, 63, 236-238 PMID: 17329822
14. Stevenson, C.E.M.; **Freel Meyers, C.L.**; Walsh, C.T.; Lawson, D.M. Crystallization and preliminary X-ray analysis of the O-carbamoyltransferase NovN from the novobiocin-biosynthetic cluster of Streptomyces spheroides *Acta Crystallogr. Sect. F Struct. Biol. Cryst. Commun.* 2008, 64, 1000-1002 PMID: PMC2581686
15. Majumdar, A; Shah, M.; Bitok, J.K.; Hassis-LeBeau, M.; **Freel Meyers, C.L.** Probing phosphorylation by non-mammalian isoprenoid biosynthetic enzymes using  $^1\text{H}$ - $^{31}\text{P}$ - $^{31}\text{P}$ -correlation spectroscopy. *Molecular BioSystems* 2009, 5, 935-944. *\*featured in the "Emerging Investigators Issue"*; PMID: PMC3161243
16. Brammer, L.; **Freel Meyers, C.L.** Revealing substrate promiscuity of 1-deoxy-D-xylulose 5-phosphate synthase. *Org. Lett.* 2009, 11, 4748-4751. PMID: PMC2761658
17. Nyland, R.; Xiang, Y.; Liu, P.; **Freel Meyers, C.L.** IspG converts an epoxide substrate to (E)-4-hydroxy-3-methylbut-2-enyl diphosphate: implications for IspG catalysis in isoprenoid biosynthesis. *J. Am. Chem. Soc.* 2009, 131, 17734-17735. PMID: 19919056 This research was not supported by NIH.
18. Garcia, I.G.; Stevenson, C.E.M.; Uson, I; **Freel Meyers, C.L.**; Walsh, C.T.; Lawson, D.M.; The crystal structure of the novobiocin biosynthetic enzyme NovP: The first representative structure for the TyIF O-methyltransferase superfamily. *J. Mol. Biol.* 2010, 395, 390-407. PMID: PMC2813333.
19. Majumdar, A; Sun, Y.; Shah, M.; **Freel Meyers, C.L.** Versatile  $^1\text{H}$ - $^{31}\text{P}$ - $^{31}\text{P}$  COSY 2D NMR Techniques for the Characterization of Polyphosphorylated Small Molecules *J. Org. Chem.*, 2010, 75, 3214-3223. PMID: PMC2874677

20. Xiao, Y., Nyland, R.L., **Freel Meyers, C.L.**, Liu, P. Methylerythritol cyclodiphosphate (MEcPP) in deoxyxylulose phosphate pathway: synthesis from an epoxide and mechanisms *Chem. Commun.*, 2010, 46, 7220–7222. PMCID: PMC3170881
21. Xiao, Y.; Rooker, D.; You, Q.; **Freel Meyers, C.L.** and Liu, P. IspG-catalyzed positional isotopic exchange in methylerythritol cyclodiphosphate of the deoxyxylulose phosphate pathway: Mechanistic implications. *ChemBioChem.*, 2011, 12, 527-530. PMCID: PMC3257810
22. Brammer, L.A.; Smith, J.M.; Wade H.; **Freel Meyers, C.L.** 1-Deoxy-D-xylulose 5-phosphate synthase catalyzes a novel random sequential mechanism. *J. Biol. Chem.* 2011, 286, 36522-36531. PMCID: PMC3196101
23. Webster, M.; Zhao, M.; Rudek, M.A., Hann, C.; **Freel Meyers, C.L.** Bisphosphonamidate clodronate prodrug exhibits potent anticancer activity in non-small-cell lung cancer cells. *J. Med. Chem.* 2011, 54, 6647-6656 PMCID: PMC3188694
24. Smith, J.M.; Vierling, R.J. and **Freel Meyers, C.L.** Selective inhibition of *E. coli* 1-deoxy-D-xylulose-5-phosphate synthase by acetylphosphonates. *MedChemComm* 2012, 3(1), 65 – 67. NIHMSID: 368479, PMCID in progress.
25. Bitok, J. K.; **Freel Meyers, C.L.** Activation and stabilization of cyclodiphosphate synthase IspF by 2C-methyl-D-erythritol-4-phosphate. *ACS Chem. Biol.* 2012, DOI: 10.1021/cb300243w, PMCID in progress.
26. Bitok, J. K.; **Freel Meyers, C.L.** Synthesis and evaluation of stable substrate analogs as potential modulators of cyclodiphosphate synthase IspF. *Med. Chem. Commun.* 2012, *\*featured in the "New Talents Issue"* DOI: 10.1039/C2MD20175E, PMCID in progress.
27. Patel, H.; Nemeria, N.S.; Brammer, L.A.; **Freel Meyers, C.L.\***; Jordan, F.\* Observation of thiamin-bound intermediates and microscopic rate constants for their interconversion on 1-deoxy-D-xylulose 5-phosphate synthase: Dramatic rate acceleration of pyruvate decarboxylation by D-glyceraldehyde-3-phosphate. *Manuscript under revision.*
28. Morris, F.; Boucher, L.; Bosch, J.; **Freel Meyers, C.L.** DXP synthase-catalyzed C-N bond formation: substrate specificity and implications for selective inhibitor design. *Manuscript in preparation.*
29. Meyers, D.J.; Tang Girdwood, S.; Smith, J.M.; Shapiro, T.; **Freel Meyers, C.L.** Fosmidomycin analogs targeting non-mammalian isoprenoid biosynthesis through inhibition of IspC. *Manuscript in preparation.*

30. Webster, M.; Connis, N.; Zhao, M.; Rudek, M.A., Hann, C.; **Freel Meyers, C.L.** Potent anticancer activity of bisphosphonamidate clodronate prodrug in melanoma. *Manuscript in preparation.*
31. DeColli, A.; Brammer, L.A.; **Freel Meyers, C.L.** Characterization of acetolactate synthase activity exhibited by 1-Deoxy-D-xylulose 5-phosphate synthase. *Manuscript in preparation.*

#### **Review articles:**

1. Walsh, C.; **Freel Meyers, C. L.**; Losey, H.C. Antibiotic glycosyltransferases: antibiotic maturation and prospects for reprogramming. *J. Med. Chem.* **2003**, 46, 3425-36 PMID: 12877577
2. Walsh, C.; Losey, H.C., **Freel Meyers, C.L.** Antibiotic glycosyltransferases. *Biochem Soc Trans.* **2003**, 31, 487-92. PMID: 12773141

#### **Book Chapters:**

1. **Freel Meyers, C.L.** *Thin Layer Chromatography*, Current Protocols in Nucleic Acids Chemistry, **2000**, Supplement 3, A.3D.1-A.3D.8.
2. **Freel Meyers, C.L.** *Flash Chromatography*, Current Protocols in Nucleic Acids Chemistry, **2000**, Supplement 3, A.3E.1-A.3D.7.

#### **Inventions, Patents, Copyrights:**

1. P10727-01 Assay for determining DXP Synthase Catalytic Activity, United States Provisional 61/173,706 29-Apr-2009
2. P10728-01 Inhibitors of Non-Mammalian Isoprenoid Biosynthesis United States Provisional 61/174,212 30-Apr-2009
3. P10728-02 Inhibitors of Non-mammalian Isoprenoid Biosynthesis United States Provisional 61/328,713 28-Apr-2010
4. P11051-01 Naphthyl-based Inhibitors of DXP Synthase United States Provisional 61/314,426 16-Mar-2010
5. P11051-02 Inhibitors of DXP Synthase United States Provisional 61/417,517 29-Nov-2010
6. P11094-01 Bisphosphonamidate Prodrugs United States Provisional 61/328,466 27-Apr-2010

7. Bisphosphonamidate Prodrugs PCT application no. US2011/34189. 27-Apr-2011  
27, 1022

### **Extramural Funding**

#### Active:

1. "Targeting Non-mammalian Isoprenoid Biosynthesis"

8/01/2010 – 5/31/2015

R01GM084998

NIH

Total direct cost: \$1,586,208                      Current year direct cost: \$193,050

Principal investigator: Freel Meyers, C. L.

2. "Prodrugs Targeting Isoprenoid Biosynthesis"

2/01/2012 – 1/31/2014

R21AI099704

NIH

Total direct cost: \$275,000                      Current year direct cost: \$150,000

Principal investigator: Freel Meyers, C. L.

#### Completed:

"Targeting Isoprenoid Biosynthesis in *Plasmodium falciparum*"

9/01/2006 – 8/31/2008

JHMRI Pilot Grant

JHMRI

Total direct cost: \$300,000

Principal investigator: Freel Meyers, C. L.

"Prodrug Strategies for Lung Cancer"

8/01/2008 – 7/31/2011

Flight Attendants Medical Research Institute (FAMRI) Pilot Grant

FAMRI Centre of Excellence

Total direct cost: \$300,000                      Current year direct cost: \$100,000

Principal investigator: Freel Meyers, C. L.

### **EDUCATIONAL ACTIVITIES**

#### **Teaching:**

##### Classroom instruction

Pharmacology (Lecture to Second Year Medical Students), 2005 – 2009

Genes to Society (Lecture to first year medical students), 2010-current

Graduate Pharmacology (Lecture to second year students), 2005 – current  
Pharmacology tutorials (for second year medical and graduate students), 2005 – 2011  
Mechanisms in Bioorganic Chemistry, 2005 – current  
    Lecture to first year graduate students  
    Course director, 2009-current  
Chemistry-Biology Core Course (Lecture to first year graduate students), 2005 – current

### **Mentoring:**

#### *Current Advisees*

John Kipchirchir Bitok, B.S., Ph.D. candidate in BCMB, 2006-current  
Leighanne Brammer, B.S., Ph.D. candidate in BCMB, 2007-current  
Francine Morris, B.A., Ph.D. candidate in CBI, 2008-current, Awardee of Ruth L. Kirschstein National Research Service Award Individual Predoctoral Fellowship (2011 –2012)  
Ryan Vierling, B.S., Ph.D. candidate in CBI, 2009-current  
Jessica Mott, B.S., Ph.D. candidate in BCMB, 2009-current  
Katie Heflin, B.S., Ph.D. candidate in CBI, 2010-current  
David Bartee, B.S., Ph.D. candidate in CBI, 2011-current

#### *Past Advisees*

Kristen Rennoll, B.S., undergraduate research through SIP, 2006  
Meha Shah, Ph.D., Postdoctoral fellow, 2006-2008 Awardee of ACDD Postdoctoral Fellowship (2006- 2008)  
Cungen Zhang, Ph.D., Postdoctoral fellow, NMR/Mass Spec facility manager, 2006-2007  
Patrick Grohar, M.D., Ph.D., Pediatric Oncology Fellow, 2007  
Norm Zheng, Ph.D., Postdoctoral fellow, NMR/Mass Spec facility manager, 2007-2009  
TJ Odebode, B.S., undergraduate research through SIP, 2008  
Mark Zabawa, B.S., M.S. in Pharmacology, 2008-2009  
James Eaton, B.S., undergraduate research, 2008  
Mary Ensey, undergraduate research through College of Notre Dame, 2009-2010  
Rodney Nyland, Ph.D. Postdoctoral fellow, 2008-2011, Awardee of ACDD Postdoctoral Fellowship (2010-2011)  
Alicia DeColli, undergraduate research, 2011  
Marie Webster, B.A., Ph.D. candidate in Pharmacology, 2006-2011

#### *Other Supervisory roles*

Maria Hassis-LeBeau, B.S., laboratory technician, 2006-2008  
Cungen Zhang, Postdoctoral fellow, NMR/Mass Spec facility manager, 2007  
Norm Zheng, Postdoctoral fellow, NMR/Mass Spec facility manager, 2008  
Yan Sun, Ph.D., Postdoctoral fellow, NMR/Mass Spec facility manager, 2009-current

### *Rotation students*

Marie Webster (Pharmacology, 2006), John Bitok (BCMB, 2006), Jason Howard (Pharmacology, 2006), Leighanne Brammer (BCMB, 2006), Jackie McKenna (CBI, 2006), Sonya Tang (BCMB, Md/Ph.D., 2006), Blair Dancy (BCMB, 2007), Mark Zabawa (Pharmacology, 2007), Francine Morris (CBI, 2007), Ryan Vierling (CBI, 2009), Jessica Mott (BCMB, 2009), Daniel Marous (Pharmacology, 2010), Katie Heflin (CBI, 2010), Polina Prusevich (Pharmacology, 2010), Lily Raines (BCMB, 2011), Sam Hong (CBI, 2011), Darcie Long (CBI, 2011), David Bartee (CBI, 2011/2012), Rebecca Walter (BCMB 2012)

### *Thesis committees*

Jason Crawford Ph.D. candidate in Chemistry, 2007, committee member  
Jeffery Culhane, Ph.D. candidate in Chemistry, 2008, committee member  
Anna Vagstad, Ph.D. candidate in CBI, 2008-current, committee member  
Marie Webster, Ph.D. candidate in Pharmacology, 2008-current, advisor  
John Bitok, Ph.D. candidate in BCMB, 2008-current, advisor  
Erin Bowers, Ph.D. candidate in CBI, 2009-current, committee member  
Adam Newman, Ph.D. candidate in CBI, 2009-current, committee member  
Leighanne Brammer, Ph.D. candidate in BCMB, 2009-current, advisor  
Amy Guminski, Ph.D. candidate in CBI, 2010-current, committee member  
Francine Morris, Ph.D. candidate in CBI, 2010-current, advisor  
Jessica Mott, Ph.D. candidate in BCMB, 2010-current, advisor  
Lindsay Avery, Ph.D. candidate in Pharmacology, 2011-current, committee member  
Ryan Vierling, Ph.D. candidate in CBI, 2009-current, advisor  
Jolyn Gisselberg, Ph.D. candidate in JHSPH, thesis reader  
Daniel Marous, Ph.D. candidate in Pharmacology, 2012-current

### *Training grant participation*

Biochemistry, Cellular and Molecular Biology (BCMB) Training Program, 2005 – current

- Serve on BCMB Policy Committee
- Serve on admissions committee
- Interview applicants
- Serve as research mentor for rotation students and graduate students

Training in Anti-Cancer Drug Development, 2005-current

- Interview applicants
- Serve as research mentor for graduate students and postdoctoral fellows

Pharmacology Graduate Program, 2005-current

- Interview applicants



- Serve as research mentor for graduate students
- Chemistry-Biology Interface (CBI) program, 2005-current
- Serve on admissions committee
  - Interview applicants
  - Serve as research mentor for rotation students and graduate students

## ORGANIZATIONAL ACTIVITIES

### **Institutional Administrative Appointments**

Policy Committee, Biochemistry, Cellular and Molecular Biology (BCMB) Graduate Program, 2007-current

Admissions Committee, Biochemistry, Cellular and Molecular Biology graduate Program, 2006-2009, 2011-current

Admissions Committee, Chemistry-Biology Interface Graduate Program, 2006-2009, 2011-current

Silver Book Review Committee, 2006

Graduate Education Committee, 2008

Academic Advising Committee, Chemistry-Biology Interface Program, 2010, 2012

Curriculum Reform Committee, BCMB, 2012

### **Editorial Activities** (Journal peer review activities)

*Angew. Chem. Int. Ed Engl.*

*Biochem.*

*Bioorg. Med. Chem. Lett.*

*FEBS Lett.*

*J. Am. Chem. Soc.*

*Med. Chem. Comm.*

*Proc. Natl. Acad. Sci. USA*

*Nature*

*J. Med. Chem.*

*ACS Chem. Biol.*

*PLOS Neglected Tropical Diseases*

### **Advisory Committees**

MTU Presidential Council of Alumnae, 2006-current

Silver Book Review Committee, 2006

Graduate Education Advisory Committee (JHUSOM), 2008

### **Review Groups/Study Sections**

Institute for Clinical and Translational Research (ICTR), 2010, grant reviewer

Johns Hopkins Brain Science Institute (BSi), 2011, grant reviewer  
National Institutes of Health (NIH), 2011, grant reviewer, “Chemical Approaches to  
Target Validation for Drug Resistant Pathogens” panel

### **Professional Societies**

American Chemical Society (1994-current)  
American Association for Cancer Research (1999-current)  
Presidential Council of Alumnae, Michigan Technological University (2006-current)  
American Society for Biochemistry and Molecular Biology (2011-current)

### **Conference Session Chair**

“Biologically-Related Molecules and Processes” session chair, 240<sup>th</sup> ACS National  
Meeting, Boston, MA, August 2010.  
Frontiers at the Chemistry-Biology Interface Symposium, session chair, University of  
Delaware, April 2011

## **RECOGNITION**

### *Awards, Honors*

Dow Chemical Company Foundation Undergraduate Research Fellowship, Michigan  
Technological University (1993)  
American Institute of Chemists Award for Excellence in Chemistry, Michigan  
Technological University (1994)  
Carl A. Whiteman Outstanding Teaching Award in Chemistry, University of Rochester  
(1996)  
Sherman-Clarke Fellowship, University of Rochester (1995-98)  
Indiana Elks Fellowship, Purdue University (1997-98)  
National Institutes of Health – National Cancer Institute Cancer Center Training Grant,  
Purdue University (1998-99)  
Jenkins/Knevel Award for Excellence in Research, Purdue University (2000)  
Phi Lambda Upsilon Award for Travel (2001)  
National Institutes of Health Postdoctoral Fellowship (AI054007-01, 2002-05)  
American Cancer Society Postdoctoral Fellowship (declined, 2002)  
MTU Presidential Council of Alumnae, inducted in 2006

Keynote Speaker, Department of Chemistry Awards Program, Michigan Technological University, April 2008

*Invited Talks, Panels*

1. "Novobiocin Biosynthesis: Noviose Transfer and Modification", Department of Biological Chemistry and Molecular Pharmacology, Harvard Medical School, October 2003.
2. "Aminocoumarin Antibiotic Biosynthesis", Department of Medicinal Chemistry, Rutgers, October 2004
3. "Aminocoumarin Antibiotic Biosynthesis", Department of Chemistry, Temple University, October 2004
4. "Aminocoumarin Antibiotic Biosynthesis", Department of Medicinal Chemistry and Molecular Pharmacology, Purdue University, November 2004
5. "Aminocoumarin Antibiotic Biosynthesis", Department of Pharmacology and Molecular Sciences, Johns Hopkins University School of Medicine, December 2004
6. "Aminocoumarin Antibiotic Biosynthesis", Department of Biochemistry and Molecular Pharmacology, University of Massachusetts, Worcester, December 2004
7. "Aminocoumarin Antibiotic Biosynthesis", Department of Chemistry, University of Illinois, January 2005
8. "Aminocoumarin Antibiotic Biosynthesis", Department of Chemistry, Berkeley University, January 2005
9. "Novel Prodrug Activation Strategies", Department of Pharmacology and Molecular Sciences, Johns Hopkins University School of Medicine, March 2006
10. "Tools for Chemoenzymatic Synthesis in the MEP Pathway", Department of Chemistry, Michigan Technological University, April 2008
11. "Probing Enzymatic Phosphorylation Using  $^1\text{H}$ - $^{31}\text{P}$ - $^{31}\text{P}$  Correlation Spectroscopy", "Frontiers in Protein Science and Enzymology" session, 237<sup>th</sup> ACS National Meeting, Salt Lake City, UT, March 2009.
12. "Exploring Catalytic Promiscuity of 1-Deoxy-D-Xylulose 5-Phosphate Synthase", Gordon Research Conference (Enzymes, Coenzymes & Metabolic Pathways), Waterville Valley, NH, July 2009
13. "Targeting Non-mammalian Isoprenoid Biosynthesis", Gordon Research Conference (New Antibacterial Discovery and Development), Galveston, TX, March 2010
14. "Bisphosphonamidate Prodrug Strategy for the Intracellular Delivery of Clodronate", Frontiers and the Chemistry and Biology Interface, May 2010
15. "Anti-parasitic Activity of a Bisphosphonamidate Clodronate Prodrug", "Chemistry for Preventing and Combating Disease" session, 240<sup>th</sup> ACS National Meeting, Boston, MA, August 2010

16. "The Chemistry of DXP Synthase: Toward Selective Targeting of Early Stage Isoprenoid Biosynthesis", Department of Chemistry, College of Notre Dame, November 2010
17. "The Chemistry of DXP Synthase: Toward Selective Targeting of Early Stage Isoprenoid Biosynthesis", AstraZeneca, Waltham, MA, December 2010
18. "The Chemistry of DXP Synthase: Toward Selective Targeting of Early Stage Isoprenoid Biosynthesis", Department of Biophysics and Biophysical Chemistry, Johns Hopkins University School of Medicine, May 2011
19. "1-Deoxy-D-xylulose-5-phosphate synthase: A new twist in thiamine diphosphate-dependent enzymology", "Breakthroughs in Biological Chemistry" session, 242<sup>th</sup> ACS National Meeting, Denver, CO, September 2011
20. "Intracellular delivery of polyphosphonates: The chemistry and biology of bisphosphonamidate prodrugs", Department of Chemistry and Biochemistry, Georgia Tech, September 2011.
21. "The Chemistry of DXP Synthase: Toward Selective Targeting of Early Stage Isoprenoid Biosynthesis", Department of Chemistry, Rutgers, The State University of New Jersey, October 2011
22. "The Chemistry of DXP Synthase: Toward Selective Targeting of Early Stage Isoprenoid Biosynthesis", Milton S. Eisenhower Research Center, The Johns Hopkins University Applied Physics Laboratory, October 2011
23. "The Chemistry of DXP Synthase: Toward Selective Targeting of Early Stage Isoprenoid Biosynthesis", Brown University, Department of Chemistry, November 2011
24. "The Chemistry of DXP Synthase: Toward Selective Targeting of Early Stage Isoprenoid Biosynthesis", University of Maryland, Department of Chemistry and Biochemistry, November 2011
25. "Intracellular delivery of polyphosphonates: The chemistry and biology of bisphosphonamidate prodrugs", University of Minnesota, Department of Medicinal Chemistry, March 2012
26. "Intracellular delivery of polyphosphonates: The chemistry and biology of bisphosphonamidate prodrugs", Cornell University, Department of Chemistry and Chemical Biology, March 2012
27. "Toward development of selective DXP synthase inhibitors", ASBMB National Meeting, "Chemistry in the Service of Medicine" session, April 2012

*Upcoming invited talks*

Duke University, Department of Chemistry, October 2012

University of Florida, Department of Chemistry, November 2012

University of Delaware, Department of Chemistry, December 2012

Johns Hopkins University School of Medicine, Department of Pharmacology and Molecular Sciences, December 2012

*Upcoming invited talks, cont.*

Washington University, Pediatrics Infectious Diseases, January 2013

Albert Einstein College of Medicine, Department of Biochemistry, March 2013