

Curriculum Vitae
Jane M. Liu

Pomona College
Chemistry Department
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EDUCATION AND TRAINING

Tufts University School of Medicine, Boston, MA: 2006-2009
TEACRS (IRACDA/NIGMS) Postdoctoral Fellow

Harvard University, Cambridge, MA: 2001-2006
Ph.D., Chemistry

Swarthmore College, Swarthmore, PA: 1996-2000
B.A., Biochemistry, High Honors

ACADEMIC POSITIONS HELD

Associate Professor of Chemistry, Pomona College: 2017-present

Teaching: General Chemistry, Organic Chemistry, Biochemistry, Chemical Biology, and Research in Chemistry and Molecular Biology

Assistant Professor of Chemistry, Pomona College: 2012-2017

Assistant Professor of Chemistry, Drew University: 2009-2012

RESEARCH EXPERIENCE

Principle Investigator, Pomona College, Department of Chemistry: 2012-present

Investigating regulatory small RNAs in Vibrio cholerae; engineering riboswitch-based biosensors

Sabbatical Leave Research: Visiting Associate of Biology and Biological Engineering, California Institute of Technology: 2015-2016

Proteome Exploration Laboratory (Laboratory directed by Sonja Hess). Research in mass spectrometry based proteomics

Principle Investigator, Drew University, Department of Chemistry: 2009-2012

Research on non-canonical RNAs in Escherichia coli and Vibrio cholerae

NIH/NIGMS IRACDA Postdoctoral Fellow, Tufts University School of Medicine: 2006-2009

Department of Molecular Biology and Microbiology (Laboratory of A. Camilli). Experimental discovery of new sRNAs in the enteric pathogen Vibrio cholerae through the use of direct cloning, 5S/tRNA-depletion and massively parallel sequencing

NSF Predoctoral Fellow/Graduate Research Assistant, Harvard University: 2001-2006

Department of Chemistry and Chemical Biology (Laboratory of D.R. Liu). Functional dissection of natural RNAs in Escherichia coli and Saccharomyces cerevisiae by nonhomologous random recombination and in vivo selections

Undergraduate Research Assistant, Swarthmore College: 1999-2000

Department of Chemistry (Laboratory of R.S. Paley). Honors thesis exploring intramolecular pinacol coupling and ring-closing metathesis of enantiopure sulfinyl iron(0) dienes

Summer Research Assistant, Rutgers University - New Brunswick: 1998

Department of Chemistry (Laboratory of R.A. Jones). Synthesized ¹⁵N-labeled guanosine for investigations on metal-binding by RNA

FELLOWSHIPS, GRANTS AND AWARDS/RECOGNITION

Research grants

Henry Dreyfus Teacher-Scholar Award: 2016-2021

Title: "Molecular Understanding and Applications of Bacterial RNAs"

\$60,000

National Institutes of Health Research Grant R15 AI090606: 2010-2018

Title: "Small RNAs and *Vibrio cholerae* adaptation to different carbon sources"

Principle Investigator

\$750,861

National Science Foundation Research Grant CBET-1258307: 2012-2018

Title: "CAREER: Riboswitch-based whole-cell biosensors to detect small organic molecules: A combined educational and research plan"

Principle Investigator

\$404,795

Training in Education and Critical Research Skills (TEACRS) Postdoctoral Fellowship, National Institute of General Medical Science (NIGMS): 2006-2009

National Science Foundation (NSF) Graduate Research Fellowship: 2002-2005

Professional awards and recognition

Jean Dreyfus Lectureship for Undergraduate Institutions (co-lead Principal Investigator, \$18,500): 2017

Henry Dreyfus Teacher-Scholar Award: 2016

Wig Distinguished Professor Award for Excellence in Teaching, Pomona College: 2015

National Institutes of Health Academic Research Enhancement Award: 2014

National Science Foundation CAREER Award: 2012

National Institutes of Health Academic Research Enhancement Award: 2010

Distinction in Teaching for leading two discussion sections in Chemistry 27 (undergraduate organic and biological chemistry) at Harvard University: 2004. *This distinction is granted by the Committee for Undergraduate Education based on teaching evaluations from students*

Distinction in Teaching for Chem 30, Organic Chemistry II, Harvard University: 2002

Distinction in Teaching for Chem 27, Organic Chemistry of Life, Harvard University: 2002

Distinction in Teaching for Chem 17, Organic Chemistry, Harvard University: 2001

Elected to Phi Beta Kappa: 2000

Elected to Sigma Xi: 2000

PUBLICATIONS (asterisk: work from J. Liu's independent career; underlined: students mentored by J. Liu)

1. *Page K, Shaffer J, Lin S, Zhang M, **Liu JM**. Engineering riboswitches *in vivo* using dual genetic selection and fluorescence-activated cell sorting. *ACS Synthetic Biology*. **2018**. *In press*.
2. *Byer T, Wang J, Zhang M, Blachman A, Vather N, Visser B, **Liu JM**. MtlR negatively regulates mannitol utilization by *Vibrio cholerae*. *Microbiology*. **2017**, *163*, 1902-1911.
3. ***Liu JM**, Sweredoski MJ, Hess S. Improved 6-plex tandem mass tags quantification throughput using a linear ion trap-high-energy collision induced dissociation MS3 scan. *Analytical Chemistry*. **2016**, *88*, 7471-7475.

4. *Vasquez TE, Saldaña C, Muzikar KA, Mashek D, **Liu JM**. Searching for synthetic antimicrobial peptides: An experiment for organic chemistry students. *Journal of Chemical Education*. **2016**, *93*, 1103–1107.
5. *Chang H, Replogle JM, Vather N, Tsao-Wu M, Mistry R, **Liu JM**. A *cis*-regulatory antisense RNA represses translation in *Vibrio cholerae* through extensive complementarity and proximity to the target locus. *RNA Biology*. **2015**, *12*, 136-148.
6. *Mustachio LM, Aksit S, Mistry RH, Scheffler R, Yamada A, **Liu JM**. The *Vibrio cholerae* mannitol transporter is regulated post-transcriptionally by the MtlS small RNA. *Journal of Bacteriology*. **2012**, *194*, 598-606.
7. ***Liu JM**, Camilli A. Discovery of sRNAs by high-throughput sequencing. In: Kwon YM, Ricke SC eds. *Methods in Molecular Biology*. Vol 733. New York, NY: Humana Press; **2011**.
8. ***Liu JM**, Camilli A. A broadening world of bacterial small RNAs. *Current Opinions in Microbiology* **2010**, *13*, 18-23.
9. Wang W, Zha J, Han Q, Wang G, Yang G, Shallop AJ, **Liu JM**, Gaffney BL, Jones, RA. Modulation of RNA metal binding by flanking bases: ¹⁵N NMR evaluation of GC, tandem GU, and tandem GA sites. *Nucleosides, Nucleotides & Nucleic Acids* **2009**, *28*, 424-434.
10. Paley RS, Berry KE, **Liu JM**, Sanan TT. Diastereoselective intramolecular pinacol couplings of sulfinyl iron(0) diene complexes. *Journal of Organic Chemistry* **2009**, *74*, 1611-1620.
11. **Liu JM**, Livny J, Lawrence MS, Kimball MD, Waldor MK, Camilli A. Experimental discovery of sRNAs in *Vibrio cholerae* by direct cloning, 5S/tRNA-depletion and parallel sequencing. *Nucleic Acids Research* **2009**, *37*, e46.
12. **Liu JM**, Liu, DR. Discovery of a mRNA mitochondrial localization element in *Saccharomyces cerevisiae* by nonhomologous random recombination and *in vivo* selection. *Nucleic Acids Research* **2007**, *35*, 6750-6761.
13. **Liu JM**, Bittker JA, Lonshteyn M, Liu DR. Functional dissection of sRNA translational regulators using nonhomologous random recombination and *in vivo* selection. *Chemistry & Biology* **2005**, *12*, 757-767.
14. Bittker JA, Le BV, **Liu JM**, Liu DR. Directed evolution of protein enzymes using nonhomologous random recombination. *Proceedings of the National Academy of Sciences USA* **2004**, *101*, 7011-7016.
15. Paley RS, **Liu JM**, Lichtenstein BR, Knoedler VL, Sanan TT, Adams DJ, Fernandez J, Rablen PR. Simultaneous and stereoselective formation of planar and axial chiralities in enantiopure sulfinyl iron diene complexes. *Organic Letters* **2003**, *5*, 309-312.

PRESENTATIONS (asterisk: work from J. Liu's independent career; underlined: students mentored by J. Liu)

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1. ***Liu JM**, Page K, Shaffer J, Lin S. **2018**. Evolving novel riboswitches through *in vivo* genetic selection and cell sorting. 5th International Conference on Regulating with RNA in Bacteria and Archaea: Seville, Spain. (Poster Presentation)
 2. ***Liu JM**. **2018**. RNA + Bacteria + Evolution = Sensors! Department of Chemistry: Hope College. (Invited Seminar on Research)
 3. *Hanson P[‡], Kowalski JR[‡], **Liu JM**[‡], Stultz L[‡]. **2017**. Creating synergy by integrating interdisciplinary research and teaching (I²RT). 2017 IRACDA Conference: Birmingham, AL. (1.5-hour Symposium/Mini-Workshop) [[‡]Co-presenters]
 4. *Cunningham A[‡] and **Liu JM**[‡]. **2017**. Starting with the end in mind: Selecting assessment tools that improve learning and satisfy accountability. 2017 WASC Senior College and University Commission

Academic Resource Conference: San Diego, CA. (1-hour Symposium/Mini-Workshop) [†Co-presenters]

5. ***Liu JM. 2016.** Creating riboswitch-based whole cell biosensors for small organic molecules. 252nd ACS National Meeting: Philadelphia, PA. (Oral Presentation, Young Academic Investigator Symposium)
6. ***Coyle MC, Hansen E, Sweredoski MJ, Solvik T, Moradian A, Hess S, Liu JM. 2016** The sRNA MtlS and post-translational regulation of the mannitol transporter in *Vibrio cholerae*. Gordon Research Conference, Microbial Stress Response: Mount Holyoke, MA. (Poster Presentation)
7. ***Liu JM, Sweredoski MJ, Hess S. 2016** Increasing protein quantification in 6-plex TMT experiments. 64th ASMS Conference on Mass Spectrometry and Allied Topics: San Antonio, TX. (Poster Presentation)
8. ***Vather N, Blachman A, Liu JM. 2016** MtlR regulates transport of the sugar alcohol mannitol in *Vibrio cholerae*. Gordon Research Conference, Sensory Transduction in Microorganisms: Ventura, CA. (Poster Presentation)
9. ***Coyle MC, Hansen E, Sweredoski MJ, Solvik T, Moradian A, Hess S, Liu JM. 2015.** Mass spectrometry-based identification of proteins affected by the mannitol operon small RNA, MtlS, in *Vibrio cholerae*. 4th International Conference on Regulating with RNA in Bacteria and Archaea: Cancun, Mexico. (Poster Presentation)
10. ***Liu JM. 2014.** Small RNAs, Big Roles in Gene Regulation. Department of Microbiology: University of California, Riverside. (Invited Seminar on Research)
11. ***Scheffler R, Vather N, Replogle J, Mistry R, Liu JM. 2013** A noncoding RNA inhibits synthesis of the mannitol permease in *Vibrio cholerae*. 3rd International Conference on Regulating with RNA in Bacteria: Würzburg, Germany. (Poster Presentation)
12. ***Liu JM. 2013.** Small RNAs and sugars in *Vibrio cholerae*: Sweet regulation. Department of Biology: Harvey Mudd College. (Invited Seminar on Research)
13. ***Liu JM. 2012.** Great big world of bacterial small RNAs. Keck School of Medicine (Global Medicine Program): University of Southern California. (Invited Seminar on Research)
14. ***Liu JM, Mustachio LM, Aksit A, Mistry R. 2011.** The *Vibrio cholerae* MtlS small RNA regulates gene expression in response to changes in carbon source. ASM Conference on Regulating RNA in Bacteria: San Juan, Puerto Rico. (Poster Presentation)
15. **Liu JM, Kimball MD, Camilli A. 2009.** An sRNA regulator of mannitol uptake in *Vibrio cholerae*. Symposium on Bacterial Cell Biology and Pathogenesis: Umea, Sweden. (Oral Presentation)
16. **Liu JM, Livny J, Lawrence MS, Waldor MK, Camilli A. 2008.** Experimental discovery of sRNAs in *V. cholerae*. 108th General Meeting of the American Society for Microbiology: Boston, MA. (Poster Presentation)
17. Kowalski JR[†], **Liu JM[†]. 2008.** Teaching information literacy, critical thinking, and scientific communication skills to senior biology majors through a sequenced writing project on cancer biology. 2008 IRACDA Conference: Chapel Hill, NC. (Oral Presentation) [†Co-presenters]
18. **Liu JM, Liu DR. 2006.** Characterization of an mRNA localization element in *S. cerevisiae* by nonhomologous random recombination and *in vivo* selection. 11th Annual Meeting of the RNA Society: Seattle, WA. (Poster Presentation)

RESEARCH EXPERIENCE WITH STUDENTS

Supervised Research Students at Pomona College (underlined: under-represented minority student)
‡Beckman Scholar; §Fulbright Scholar / Watson Fellow; *Goldwater Scholar; **ASM-Undergraduate Research Fellow

<i>Student (class year)</i>	<i>Term(s)</i>	<i>Current/last known position</i>
<u>Sabrina Mendez-Contreras</u> ('18)	May 2017 – May 2018	B.A. Molecular Biology Research Assistant, Broad Institute
Maryann Zhao# ('18)	Jan 2017 – Aug 2018	B.A. Art
Jessica Wang ('18)	Jan 2017– May 2018	current Pomona undergraduate
Samuel Lin ('20)	Jan 2017 – Jul 2017	current Pomona undergraduate
<u>Theodore Lang</u> ('19)	Jan 2017 – present	current Pomona undergraduate
Christina Beck# ('20)	Jane 2017 – present	Ph.D. student, Caltech
Katharine Page ('17)	May 2016 – Aug 2017	Ph.D. student, Caltech
Mark Zhang# ('17)	Mar 2016 – Jul 2018	Watson Fellow
<u>Tanner Byer</u> *§ ('17)	Mar 2016 – May 2017	M.D. student, Harvard University
<u>Elisabeth Hansen</u> § ('16)	Jan 2015 – May 2016	M.D./Ph.D. student, Duke University
Marek Zorawski§ ('16)	Jan 2015 – May 2016	Intern, Ginkgo Bioworks, Inc.
Jeremy Shaffer ('15)	Sept 2014 – Aug 2016	M.D. student, Penn State
Maya Tsao-Wu ('17)	May 2014 – May 2017	Ph.D. student, UCLA
<u>Erick Velasquez</u> ('16)	Mar 2014 – May 2016	McKinsey & Company
Anna Blachman ('16)	Mar 2014 – May 2016	M.D. student, USC
Catherine Song ('17)	Jan 2014 – May 2015	M.D. student, USC
Daniel Phan ('16)	Jan 2014 – May 2016	Ginkgo Bioworks, Inc.
Laurel Estes ('15)	Jan 2014 – May 2015	Master's student, UC Irvine
<u>Cristina Saldaña</u> ('15)	Summer 2013	Post-bac Student, UC Irvine
Howard Chang ('14)	May 2013 – May 2014	Consultant, So. Ca. Edison
Abe Cass ('14)	Jan 2013 – Aug 2013	Ph.D. student, UC Berkeley
Maxwell Coyle ('14)	Jan 2013 – May 2014	Ph.D. student, MIT
John Replogle ('14)	Jan 2013 – May 2014	Ph.D. student, UCSF
Kristina Solvik** ('15)	Jan 2013 – May 2015	M.D. student, U. Iowa
<u>Naomi Vather</u> ('15)	Jan 2013 – May 2015	

Supervised Research Students at Drew University (underlined: under-represented minority student)

* Goldwater Scholar; ** ASM-Undergraduate Research Fellow; # Successfully wrote and defended honors research thesis

<i>Student (class year)</i>	<i>Term(s)</i>	<i>Current/last known position</i>
<u>Stacey Ceron</u> ('12)	Sept 2011 – May 2012	Ph.D. student, Dartmouth College
Aleksander Kubiak ('13)	Summer 2011	M.D. student, Drexel University
Taras Varshavsky ('13)	Summer 2011	M.D., Rutgers University
Jarod Grossman ('12)	Jan 2011 – Aug 2011	Ph.D., Syracuse University
Ross Shamby ('11)	Fall 2010	Ph.D. student, Tulane University
Lalita Nekkanti ('11)	Fall 2010	Dental student, Tufts University
Robert Scheffler*# ('14)	Jul 2010 – May 2014	Ph.D. student, Princeton University
Ronak Mistry# ('13)	May 2010 – May 2013	D.O., Rowan University
Akikuni Yamada ('11)	Jun 2010 – Dec 2010	B.A. Biochem. Mol. Biol
<u>Selime Aksit</u> **# ('12)	Jan 2010 – Aug 2012	Medical student, Hacettepe Medical School
Lisa Maria Mustachio# ('11)	Jan 2010 – May 2011	Ph.D., Dartmouth College

REPRESENTATIVE STUDENT RESEARCH PRESENTATIONS – PEER-REVIEWED ABSTRACTS

(underlined: students mentored by J. Liu; *: presenting author)

1. Zhang M* and **Liu JM**. 2018. Exploring the regulation of a *cis*-antisense RNA in *Vibrio cholerae*. ASM Microbe 2018: Atlanta, GA. (Poster Presentation)

2. Mendez-Contreras S*, Tsao-Wu M, **Liu JM. 2018**. Identifying regulatory targets of the small RNA MtlS in *Vibrio cholerae*. ASBMB 2018 Annual Meeting: San Diego, CA. (Poster Presentation)
3. Wang J*, Zhang M, **Liu JM. 2018**. Transcriptional and post-transcriptional regulation of *mtlA* in *Vibrio cholerae*. ASBMB 2018 Annual Meeting: San Diego, CA. (Poster Presentation)
4. Zhang M*, Byer T, Wang J, **Liu JM. 2017**. MtlR negatively regulates mannitol transport by *Vibrio cholerae*. SCASM 2017 Meeting: San Diego, CA. (Poster Presentation)
5. Hansen EE*, Coyle MC, **Liu JM. 2016**. Investigating the mechanism by which the small RNA MtlS regulates the mannitol protein transporter at the post-translational level in *Vibrio cholerae*. ASBMB 2016 Annual Meeting: San Diego, CA. (Oral Presentation)
6. Zorawski M*, Shaffer J, Velasquez E, **Liu JM. 2016**. Creating a riboswitch-based whole-cell biosensor for bisphenol A. ASBMB 2016 Annual Meeting: San Diego, CA. (Poster Presentation)
7. Shaffer J*, Velasquez E, **Liu JM. 2015**. Creating a riboswitch-based whole-cell biosensor for BPA. 2015 Synthetic Biology: Engineering, Evolution and Design (SEED) Conference: Boston, MA. (Poster Presentation)
8. Shaffer J*, Phan D*, Velasquez E, **Liu JM. 2015**. Creating riboswitch-based whole cell biosensors for small organic molecules. 115th General Meeting of the American Society for Microbiology: New Orleans, LA. (Poster Presentation)
9. Vather N*, Tsao-Wu M*, **Liu JM. 2015**. MtlR is one of several regulators of mannitol transporter synthesis in *Vibrio cholerae*. 115th General Meeting of the American Society for Microbiology: New Orleans, LA. (Poster Presentation)
10. Solvik TA*, **Liu JM. 2015**. Investigating the role of CRP in mannitol operon small RNA (MtlS) expression in *Vibrio cholerae*. 115th General Meeting of the American Society for Microbiology: New Orleans, LA. (Poster Presentation)
11. Coyle M*, Replogle J*, Sweredoski M, Hess S, **Liu JM. 2014**. The MtlS small RNA affects protein levels in *Vibrio cholerae*. Keystone Symposium on Long Noncoding RNAs: Marching Toward Mechanism: Santa Fe, NM. (Poster Presentation)
12. Chang H*, Vather N, **Liu JM. 2014**. Post-transcriptional regulation of MtlA in *Vibrio cholerae* by a small non-coding RNA. Keystone Symposium on Long Noncoding RNAs: Marching Toward Mechanism: Santa Fe, NM. (Poster Presentation)

CURRICULUM DEVELOPMENT

Developed and implemented a course on analyzing scientific literature: 2017-present (Pomona College, Claremont, CA)

Applied the CREATE approach to teach students about the process of science and how to read and analyze primary literature

Developed and assessed activities to improve primary-literature-reading skills of biochemistry students: 2013-present (Pomona College, Claremont, CA)

Created activities to increase students' abilities to read and understand primary literature, including effective means of researching unfamiliar concepts or terms

Developed and assessed peptide synthesis lab for Organic Chemistry: 2013-2016 (Pomona College, Claremont, CA)

Objectives include: learning experimental design and solid phase synthesis

Developed and implemented course materials for student-centered, guided-inquiry learning in Biochemistry: 2012-present (Pomona College, Claremont, CA)

Designed and taught a course on chemical biology: 2011-present (Drew University, Madison, NJ; Pomona College, Claremont, CA)

Developed and presented entirely new curriculum for an upper-level elective in the chemistry and biochemistry program, incorporating over 40 primary literature papers and active-learning techniques; designed and implemented a sequenced writing assignment where students prepare a grant proposal to the NIH addressing a human health problem from a chemical biology perspective.

Designed and taught a “Great Challenges” course on molecular biology and human disease: 2011 (Drew University, Madison, NJ)

Co-taught, with Prof. Stephen Dunaway (Biology), a research-based course for students interested in biochemistry and molecular biology. Students worked on authentic research projects stemming from the instructors’ research programs. For most of the students, this was their first exposure to science research; nine out of the 15 students applied and were accepted to participate in the Drew Summer Science Institute, allowing them to continue independent research beyond the one semester.

Developed and implemented a sequenced writing assignment for Organic Chemistry: 2009-2010 (Drew University, Madison, NJ)

Toward developing information literacy and effective communication skills, a sequenced writing assignment was developed in which students pick an ingredient from their favorite personal care product. The students then research their chosen molecule and present their found information to a general audience.

Developed and implemented course materials for student-centered, guided-inquiry learning in General Chemistry, Organic Chemistry and Biochemistry: 2009-2012 (Drew University, Madison, NJ)

Designed and taught a course on cancer biology: 2008 (Pine Manor College, Chestnut Hill, MA)

PROFESSIONAL SERVICE

Ad hoc reviewer for PNAS: 2018

Ad hoc reviewer for Austrian Science Fund: 2017

Ad hoc reviewer for Journal of Chemical Education: 2016- 2018

Panelist for “Funding at PUIs”, hosted by TEACRS, Tufts University: March 2015; March 2018

Panel reviewer for NSF CBET grant proposals: 2014

Panelist for “Bay Area Postdocs: Workshop on Scientific Teaching”, hosted by SEPAL: February 2014

Ad hoc reviewer for *WIREs RNA*: 2013

Ad hoc reviewer for *PLoS One*: 2013

Ad hoc reviewer for Oxford University Press: 2012, 2016

Ad hoc reviewer for *ACS Synthetic Biology*: 2011

Panelist for “Negotiating the Job Offer”, National IRACDA Conference 2010: June 2010

POMONA COLLEGE SERVICE

Committees

2018 – 2019 Strategic Planning Steering Committee

2016 – 2018 Executive Committee / Division II Chair (elected position)

2013 – 2015 Academic Procedures Committee / Academic Discipline Board / Academic Standards Committee

PROFESSIONAL MEMBERSHIPS

American Chemical Society since 2005

American Society for Biochemistry and Molecular Biology since 2015

American Society for Microbiology since 2006

RNA Society since 2006