

KATHLEEN R. RYAN

Associate Professor, Plant and Microbial Biology
251 Koshland Hall, University of California, Berkeley, Berkeley, CA 94720
Mobile: 415-568-5457 Lab: 510-642-5559 krr@berkeley.edu

EDUCATION

1997 Ph. D. in Biochemistry, Cellular and Molecular Biology
Johns Hopkins University School of Medicine, Baltimore, MD
1990 A.B. *magna cum laude* in History of Science
Harvard and Radcliffe Colleges, Cambridge, MA

RESEARCH AND PROFESSIONAL EXPERIENCE

2010- Associate Professor, Plant & Microbial Biology
University of California, Berkeley
2004-2010 Assistant Professor, Plant & Microbial Biology
University of California, Berkeley
1997-2003 Postdoctoral Fellow, Developmental Biology
Stanford University School of Medicine, Stanford, CA
1996-1997 Postdoctoral Fellow, Medical Biochemistry and Genetics
Texas A&M University College of Medicine

AWARDS

2019 Berkeley Presidential Chair Fellows Program
2008 Hellman Family Faculty Fund Award
2007 Regents' Junior Faculty Fellowship
2007 College of Natural Resources Distinguished Teaching Award
2006-2007 Berkeley Presidential Chair Fellows Program
1997-2000 Helen Hay Whitney Postdoctoral Research Fellowship
1992-1996 Medical Scientist Training Program
1992 National Science Foundation Predoctoral Fellowship, declined

RESEARCH FUNDING

Defense Advanced Research Projects Agency, 04/01/17-03/31/21, \$3,379,324
Engineered Living Materials Program
"Multiscale Self-Assembly for Strong and Tough Living Materials"
Co-PI with Caroline Ajo-Franklin (LBNL), Paul Ashby (LBNL), and Michel Maharbiz (UC Berkeley)

National Science Foundation, MCB-1615287, 08/01/16-07/31/2020, \$710,562
Collaborative Research: Identifying and Modeling the Advantages of Regulating Protein Abundance in *Caulobacter crescentus*

Energy Biosciences Institute, 01/01/14-12/31/14, \$130,000
"Controlling fermentation hygiene via chlorite addition and expression of chlorite dismutase in process organisms"

National Science Foundation, MCB-0920619, 08/01/09-07/31/13, \$494,825
"Non-canonical functions of two-component signaling proteins in the cell cycle of *Caulobacter crescentus*"
Supplemental funding 08/01/13-07/31/14, \$98,964

National Science Foundation, MCB-0543801, 01/15/06-12/31/08, \$420,000
"Phosphorylation of the *Caulobacter* cell cycle regulator CtrA by two essential kinases"

US Department of Agriculture, AES CA-B*-MIC-7291-H, 10/01/04-09/30/09, \$100,000
"Regulation of CtrA proteolysis in *Caulobacter crescentus*"

UC Berkeley Committee on Research, Faculty Research Grant, 2012-2013, \$5,087
"Elucidating the role of an essential tyrosine phosphatase in *Caulobacter crescentus*"

Hellman Family Faculty Fund, 07/01/08-06/30/09, \$27,000
"Molecular mechanisms of regulated proteolysis in the bacterial cell cycle"

INVITED PRESENTATIONS

2019 ASM Microbe General Meeting, San Francisco, CA
2018 3rd International Conference on Post-translational Modifications in Bacteria
2016 Virginia Tech, Genetics, Bioinformatics & Computational Biology Seminar
2014 EMBO Workshop, Stalked Alpha-Proteobacteria and Relatives
2012 Gordon Conference, Sensory Transduction in Microorganisms
2011 Lucy Shapiro Biology Symposium, Santa Clara, CA
2011 San Francisco State University, Department of Biology
2011 USDA/UC Berkeley Plant Gene Expression Center
2010 Bacterial Cell Biology Conference, Puerto Morelos, Mexico
2009 UC Davis, Department of Microbiology
2009 UCLA, Department of Chemistry and Biochemistry
2009 Bacterial Locomotion and Signal Transduction, Cuernavaca, Mexico
2008 University of Iowa, Department of Microbiology
2008 University of Illinois at Chicago, Department of Medicine
2008 University of Chicago, Department of Biochemistry and Molecular Biology
2008 Gordon Conference, Sensory Transduction in Microorganisms
2007 MIT, Department of Biology
2007 UMass Amherst, Department of Microbiology
2006 UCSF Biochemistry Seminar Series
2006 Syracuse University, Department of Biology
2005 IUMS General Meeting, Symposium on Mechanisms and Regulation of Intracellular Protein Degradation
2005 2nd International *Caulobacter* Meeting
2005 ASM General Meeting, Symposium on Cell Division and Development in Bacteria
2003 Molecular Genetics of Bacteria and Phages
2002 1st International *Caulobacter* Meeting

PROFESSIONAL ACTIVITIES

2018- Associate Program Director, NSF-REU: Molecules to Ecosystems
2016- Faculty mentor, NSF-REU: Molecules to Ecosystems
2016-2018 NSF Molecular and Cellular Biosciences grant panelist
2015-2016 Faculty advisor, Be A Scientist middle school outreach program
2011 Fundraising Chair, Lucy Shapiro Biology Symposium
2011 External Ph.D. thesis examiner, Department of Biochemistry and Molecular Biology, The University of Melbourne
2008 YWCA Women of Achievement Keynote Speaker, Quincy, IL
2006 NSF Advisory Panel for Cellular Systems

- 2005- Ad-hoc reviewer, NSF Molecular and Cellular Biosciences
 2005- Reviewer, *Cell*, *eLife*, *Journal of Bacteriology*, *Journal of Molecular Biology*,
mBio, *Molecular Microbiology*, *Nature*, *Nucleic Acids Research*, *PLoS
 Biology*, *PLoS Genetics*, *Structure*, *Nature Microbiology*, *Scientific
 Reports*, *Microbiology*
 2002- Member, American Society for Microbiology

TEACHING

Term	Years	Course	Description	Lectures
Fall	2014-2017 and 2019	PMB/MCB 112C	General Microbiology	39
Spring	2018	PMB/MCB C148	Microbial Genomics and Genetics	13
Spring	2016	PMB 24	Freshman Seminar: Making the Most of College	13
Spring	2015	PMB 290	Bacterial Stress Responses	13
Fall	2015	PMB 220A	Microbial Genetics	10
Fall	2012-2013	PMB/MCB 112C	General Microbiology	32
Summer 10-week	2013, 2015, 2016	PMB/MCB 112C	General Microbiology	36
Spring	2011	PMB 39E	Freshman/Sophomore Seminar: Biochemistry, Microbiology, and Genetics in the Kitchen	13
Fall	2011	PMB 290	The Gram-Negative Cell Envelope	13
Fall	2007-2010,	PMB 220A	Microbial Genetics	10
Summer	2006, 2008, 2010, 2018	PMB 104L	Discovery Research in Microbiology	10
Fall	2004-2011	PMB/MCB 112C	General Microbiology	20

MENTORING

Graduate Students

Name	Degree	Project	Current position
Sarah Reisinger	Ph.D. 2008	DivL function	Vice President, Biotechnology and Process Science, Firmenich
Elaine Shapland	Ph.D. 2011	CtpA function	Head of Build, Ginkgo Bioworks
Stephen Smith	Ph.D. 2013	Mechanism of CtrA proteolysis	Scientist, Caribou Biosciences
Charlie Huang	Ph. D. 2019	HipBA toxin-antitoxin systems	Scientist, Synvivia
Justin Zik	Ph. D. 2019	Role of a tyrosine phosphatase homolog in lipid A synthesis	Postdoctoral researcher, National University of Singapore
Robyn Jasper		Regulation of envelope integrity	Graduate student

Postdoctoral Researchers

Name	Ph.D.	Dates	Current position
Romy Chakraborty	UC Berkeley, 2004	2005	Department Head, Ecology, Lawrence Berkeley National Laboratory
James Taylor	University of Cambridge, 2006	2006-2008	Research Associate, University of Ottawa
Lisa Bowers	University of Wisconsin, 2007	2007-2010	Associate Professor, St. Olaf College
Juan-Jesus Vicente	Autonoma University, Madrid 2006	2010-2012	Research Assistant Professor, University of Washington
Sneha Jani	Texas A&M University, 2016	2017-2019	Scientist, Syngenta
Vera Troselj	University of Wyoming, 2019	2020-	

Undergraduate students

Name	Degree	Current Position
Marcy Erb	2005	Postdoctoral researcher, Harvard University
Senthil Annamalai	2007	
Joanna Lee	2007	Postdoctoral researcher, Rockefeller University
Kourosh Kolahi	2008	MD, SUNY Buffalo, 2012
Paran Yap	2009	
Amrita Bajwa	2009	User Experience Researcher, Trulia
Andrew Jan	2009	
Maansi Shah	2010	MPH/MSW, UC Berkeley 2018
Aron Kamajaya	2010	Assistant Professor, Los Angeles Pierce College
Ken Zhou	2011	Internal Medicine Resident, NYU
Teodor Duro	2011	M.D., Jefferson University
Diane Wu	2011	M.D., Stanford University Medical School, 2015
Yang Yang	2012	
Lena Lau	2012	Ph. D., NYU
Ted Chavkin	2014	Graduate student, Harvard University
Katherine Trinh	2014	Medical student, Dartmouth University
Cameron Hearne	2014	Graduate student, UC Berkeley
Ming Lei	2015	Graduate student, Tufts University
Alex McGill	2015	
Arjun Gupta	2016	Dental student, Tufts University
Japna Kalra	2017	Medical student, Columbia University
Zac Brown	2018	Medical student, UCSF
Estefanie Alvarez-Ceballo	2018	
Tiffany Juan	2019	Applying to medical schools
Connor LaBella	2019	Emergency medical technician, Berkeley
Carlos Gonzalez-	2019	Research Associate, Synvivia

Lopez		
Eugene Pang	2019	Technician, Harvard University
Meghan Nolan	(2020)	Undergraduate student

SERVICE

Senate

2016-2017 Member, Undergraduate Council
2010-2015 Member, Committee on Admissions, Enrollment, and Preparatory Education
2012-2013 Member, Student Athletic Admissions Committee
2010 Interviewer, Berkeley Regents' and Chancellor's Scholars

Campus-wide

2019-2020 Member, Genetics Training Grant Steering Committee
2016-present Chair, KALX Radio Policy Advisory Board
2016-2019 Member, On the Same Page selection committee
2015-2016 Member, CalTeach Advisory Board
2007-2016 Member, KALX Radio Policy Advisory Board
2007-2010, Biology Fellows Program Selection Committee
2013
2008 Faculty Homecoming Lecturer
2007-2008 Mentor, Berkeley Regents' and Chancellor's Scholars
2006 Interviewer, Berkeley Edge Program

College of Natural Resources

2019-2021 Member, CNR Executive Committee
2017-2018 Member, CNR Awards Selection Committee
2014-2017 Member, CNR Committee on Courses and Curricula
2012-2013 Chair, CNR Executive Committee
2011-2012 Vice-chair, CNR Executive Committee
2011, 2013-2015 Mentor, CNR Biology Scholars Program
2007-2009 Member, CNR Faculty Committee on Research
2007-2009 Member, CNR Awards Selection Committee

Department

2016-2019 Chair, Microbiology Courses and Curriculum Committee
2016-2019, Member, Sydney Kustu Memorial Seminar Committee
2015-2016 Equity Advisor, Virology Faculty Search Committee
2015-2017 Undergraduate Advisor-Microbiology
2014-2015 Member, FTE Hiring Plan Committee
2013-2014 Organizing Chair, Berkeley Microbiology Retreat
2013 (Fall) Member, Graduate Group in Microbiology Steering Committee
2011-2012 Chair, Microbiology Courses and Curriculum Committee
2011-2012 Plant & Microbial Biology Equity Advisor
2010-2012 Member, Plant & Microbial Biology Events Committee
2006-2010 Member, Courses and Curriculum Committee
2004-2007, Member, Graduate Student Admissions Committee
2010-2012,
2017, 2019
2004-2006, Plant & Microbial Biology Seminar Series Committee

2012-2013, (Chair, 2016-2017)
2016-2018
2019-2020

PEER-REVIEWED PUBLICATIONS

1. Huang, C.Y., Gonzalez-Lopez, C., Henry, C., Mijakovic, I., **Ryan, K.R.** (2020) *hipBA* toxin-antitoxin systems mediate persistence in *Caulobacter crescentus*. *Sci. Rep.* 10: 2865.
2. Charrier, M., Li, D., Mann, V.R., Yun, L., Jani, S., Rad, B., Cohen, B.E., Ashby, P.D., **Ryan, K.R.**, Ajo-Franklin, C.M. (2019). Engineering the S-layer of *Caulobacter crescentus* as a foundation for stable, high-density, 2D living materials. *ACS Synth. Biol.* 8: 181-190.
3. Smith, S.C., Joshi, K.K., Zik, J.J., Trinh, K., Kamajaya, A., Chien, P., **Ryan, K.R.** (2014). A cell cycle-dependent adaptor complex for ClpXP-mediated proteolysis directly integrates phosphorylation and second messenger signals. *Proc. Nat. Acad. Sci. USA* 111: 14229-14234.
4. Shapland, E.B., Reisinger, S.J., Bajwa, A.K., and **Ryan, K.R.** (2011). An essential tyrosine phosphatase homolog regulates cell separation, outer membrane integrity, and morphology in *Caulobacter crescentus*. *J. Bacteriol.* 193: 4361-4370.
5. **Ryan, K.R.**, Taylor, J.A., and Bowers, L.M. (2009) The BAM complex subunit BamE (SmpA) is required for membrane integrity, stalk growth and normal levels of outer membrane β -barrel proteins in *Caulobacter crescentus*. *Microbiology* 156: 742-756.
6. Taylor, J.A., Wilbur, J.D., Smith, S.C., and **Ryan, K.R.** (2009) Mutations that alter RcdA surface residues decouple protein localization and CtrA proteolysis in *Caulobacter crescentus*. *J. Mol. Biol.* 394: 46-60.
7. Reisinger, S.J., Huntwork, S., Viollier, P.H., and **Ryan, K.R.** (2007). DivL performs critical cell cycle functions in *Caulobacter crescentus* independent of kinase activity. *J. Bacteriol.* 189: 8308-8320.
8. Biondi, E.G., Reisinger, S.J., Skerker, J.M., Arif, M., Perchuk, B.S., **Ryan, K.R.**, and Laub, M.T. (2006). Regulation of the bacterial cell cycle by an integrated genetic circuit. *Nature* 444: 899-904.
9. McGrath, P.T., Iniesta, A.A., **Ryan, K.R.**, Shapiro, L. and McAdams, H.H. (2006). Controlled degradation of a cell cycle master regulator requires a dynamically localized protease complex and a polar specificity factor. *Cell* 124:535-547.8
10. **Ryan, K.R.**, Huntwork, S. and Shapiro, L. (2004). Recruitment of a cytoplasmic response regulator to the cell pole is linked to its cell cycle-regulated proteolysis. *Proc. Natl. Acad. Sci. USA* 101:7415-7420.
11. Judd, E.M., **Ryan, K.R.**, Moerner, W.E., Shapiro, L. and McAdams, H.H. (2003). Fluorescence bleaching reveals asymmetric compartment formation prior to cell division in *Caulobacter*. *Proc. Natl. Acad. Sci. USA* 100:8235-8240.

12. **Ryan, K.R.**, Judd, E.M. and Shapiro, L. (2002). The CtrA response regulator essential for *Caulobacter* cell cycle progression requires a bipartite degradation signal for temporally controlled proteolysis. *J. Mol. Biol.* 324:443-55.
13. Shepard, L.A., Heuck, A.P., Hamman, B.D., Rossjohn, J., Parker, M.W., **Ryan, K.R.**, Johnson, A.E. and Tweten, R.K. (1998). Identification of a membrane-spanning domain of the thiol-activated pore-forming toxin *Clostridium perfringens* perfringolysin O: An α -helical to β -sheet transition identified by fluorescence spectroscopy. *Biochemistry* 37: 14563-14574.
14. Davis, A.J., **Ryan, K.R.** and Jensen, R.E. (1998). Tim23p contains separate and distinct signals for targeting to mitochondria and insertion into the inner membrane. *Mol. Biol. Cell* 9: 2577-2593.
15. **Ryan, K.R.**, Leung, R.S. and Jensen, R.E. (1998). Characterization of the mitochondrial inner membrane translocase complex: the Tim23p hydrophobic domain interacts with Tim17p but not with other Tim23p molecules. *Mol. Cell. Biol.* 18: 178-187.
16. **Ryan, K.R.**, Menold, M.M., Garrett, S. and Jensen, R.E. (1994). *SMS1*, a high-copy suppressor of the yeast *mas6* mutant, encodes an essential inner membrane protein required for mitochondrial protein import. *Mol. Biol. Cell* 5: 529-538.
17. **Ryan, K.R.** and Jensen, R.E. (1993). Mas6p can be cross-linked to an arrested precursor and interacts with other proteins during mitochondrial protein import. *J. Biol. Chem.* 268: 23743-23746.
18. Machamer, C.E., Grim, M. G., Esquela, A., Chung, S. W., Rolls, M., **Ryan, K.** and Swift, A.M. (1993). Retention of a *cis*-Golgi protein requires polar residues on one face of a predicted α -helix in the transmembrane domain. *Mol. Biol. Cell* 4: 695-704.
19. Ronneberg, T., Nakamura, H., Cranmer III, L. D., **Ryan, K.**, Kishi, Y. and Hastings, J.W. (1991). Gonyauline: A novel endogenous substance shortening the period of the circadian clock of a unicellular alga. *Experientia* 47: 103-106.

INVITED REVIEWS and BOOK CHAPTERS

1. Zik, J.J. and **Ryan, K.R.** The *Caulobacter crescentus* cell cycle control network: an integrated system of two-component signaling proteins, cyclic di-GMP-dependent processes, and regulated proteolysis. In *Cell Cycle Regulation and Development in Alphaproteobacteria*, ed. E. Biondi. Springer Nature, *in press*.
2. Smith, S.C., Vicente, J.-J., and **Ryan, K.R.** (2012) Cell cycle and developmental regulation by two-component signaling proteins in *Caulobacter crescentus*. In *Two-Component Systems in Bacteria*, eds. R. Gross and D. Beier. Caister Academic Press, Portland, OR.
3. Bowers, L.M., Shapland, E.B. and **Ryan, K.R.** (2008). Who's in charge here? Regulating cell cycle regulators. *Curr. Opin. Microbiol.* 11: 547-552.
4. **Ryan, K.R.** (2006). Partners in Crime: Phosphotransfer profiling identifies a multicomponent phosphorelay. *Mol. Microbiol.* 59: 361-3.
5. **Ryan, K.R.** and Shapiro, L. (2003). Temporal and spatial regulation in prokaryotic cell cycle progression and development. *Ann. Rev. Biochem.* 72: 367-394.

6. **Ryan, K.R.** and Jensen, R.E. (1995). Protein translocation across mitochondrial membranes: What a long, strange trip it is. *Cell* 83: 517-519.

PATENT APPLICATIONS

U.S. Patent Application No. 62/835,300

J. J. Zik and K. R. Ryan

Lipid A-Deficient *Caulobacter*

Application filed April, 2019