

Curriculum Vitae

Updated 01/25/2021

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EDUCATION AND TRAINING

Stanford University	Biological Sciences	B.Sc. (1999)
University of California, San Diego	Biological Sciences	Ph.D. (2004)
Stanford University	Biological Sciences	Postdoctoral scholar (2004-2006)

APPOINTMENTS

Assistant Professor, Department of Microbiology and Molecular Biology, Brigham Young University, Provo, UT 84602. (2006-2012)

Visiting Associate Professor of Genetics, Department of Molecular Biology, Harvard University Boston, MA 02114 (Jan-Aug 2015)

Visiting Scientist, Department of Biology, Massachusetts Institute of Technology Cambridge, MA 02139 (Jan-Aug 2015)

Associate Professor, Department of Microbiology and Molecular Biology, Brigham Young University, Provo, UT 84602. (2012-2018)

Professor, Department of Microbiology and Molecular Biology, Brigham Young University, Provo, UT 84602. (2018-present)

Chair, Department of Microbiology and Molecular Biology, Brigham Young University, Provo, UT 84602. (2018-present)

HONORS AND AWARDS

Ruth L. Kirschstein Postdoctoral Fellowship (declined)	(2004)
Helen Hay Whitney Postdoctoral Fellowship	(2005-2006)
NSF CAREER Award	(2011-2016)
Brigham Young University Young Scholar Award	(2013)
Presidential Early Career Award for Scientists and Engineers	(2014)
NSF Mid-Career Investigator Award	(2015)
Brigham Young University College of Life Sciences Outstanding Research Award	(2016)

PUBLICATIONS

Wendlandt C, Helliwell E, Roberts M, Nguyen K, Friesen ML, von Wettberg E, Price P, Griffiths J, Porter SS. Decreased coevolutionary potential and increased symbiont fecundity during the biological invasion of a legume-rhizobium mutualism. *Evolution*. Online ahead of print (2021; accepted in 2020).

do Amaral FP, Tuleski TR, Pankiewicz VCS, Melnyk RA, Arkin AP, Griffiths J, Tadra-Sfeir MZ, Maltempo de Souza E, Deutschbauer A, Monteiro RA, Stacey G. Diverse Bacterial Genes Modulate Plant Root Association by Beneficial Bacteria. *mBio*. 11(6):e03078-20 (2020).

GC diCenzo, M Zamani, A Checcucci, M Fondi, JS Griffiths, TM Finan, A Mengoni. Multidisciplinary approaches for studying rhizobium-legume symbioses. *Can J Microbiol*. 65(1):1-33 (2019).

GC diCenzo, AB Benedict, M Fondi, GC Walker, TM Finan, A Mengoni, JS Griffiths. Robustness encoded across essential and accessory replicons of the ecologically versatile bacterium *Sinorhizobium meliloti*. *PLoS Genet*. 14(4):e1007357 (2018).

A Metagenome-wide association study and arrayed mutant library confirm *Acetobacter* lipopolysaccharide genes are necessary for association with *Drosophila melanogaster*. KM White, MK Matthews, RC Hughes, AJ Sommer, JS Griffiths, PD Newell, JM Chaston. *G3 (Bethesda)*. 8(4):1119-1127 (2018).

MA Olson, TW Siebach, JS Griffiths, E Wilson, DL Erickson. Genome-Wide Identification of Fitness Factors in Mastitis-Associated *Escherichia coli*. *Appl Environ Microbiol*. Jan 2;84(2) (2018).

MFF Arnold, M Shabab, J Penterman, KL Boehme, JS Griffiths, GC Walker. Genome-wide sensitivity analysis of the microsymbiont *Sinorhizobium meliloti* to symbiotically important, defensin-like host peptides. *mBio*. 8(4):e01060-17 (2017).

S Yang, Q Wang, E Fedorova, J Liu, Q Qin, Q Zheng, PA Price, H Pan, D Wang, JS Griffiths, T Bisseling, H Zhu. Microsymbiont discrimination mediated by a host-secreted peptide in *Medicago truncatula*. *Proc Natl Acad Sci USA*. 114(26):6848-6853 (2017).

PR Bennallack, JS Griffiths. Elucidating and engineering thiopeptide biosynthesis. *World J Microbiol Biotechnol*. 33(6):119 (2017).

KD Bewley, PR Bennallack, MA Burlingame, RA Robison, JS Griffiths, Miller SM. Capture of micrococcin biosynthetic intermediates reveals C-terminal processing as an obligatory step for in vivo maturation. *Proc Natl Acad Sci USA*. 113(44):12450-12455 (2016).

M Shabab, MF Arnold, J Penterman, AJ Wommack, HT Bocker, PA Price, JS Griffiths, EM Nolan, GC Walker. Disulfide cross-linking influences symbiotic activities of nodule peptide NCR247. *Proc Natl Acad Sci USA*. 113(36):10157-62 (2016).

- PR Bennallack, KD Bewley, MA Burlingame, RA Robison, SM Miller, JS Griffiths. Reconstitution and Minimization of a Micrococcin Biosynthetic Pathway in *Bacillus subtilis*. *J Bacteriol.* 198(18):2431-8 (2016).
- PA Price, HR Tanner, BA Dillon, M Shabab, GC Walker, JS Griffiths. Rhizobial peptidase HrrP cleaves host-encoded signaling peptides and mediates symbiotic compatibility. *Proc Natl Acad Sci USA.* 112(49):15244-9 (2015).
- RD VanYperen, TS Orton, JS Griffiths. Genetic analysis of signal integration by the *Sinorhizobium meliloti* sensor kinase FeuQ. *Microbiology* 161(Pt 2):244-53 (2014).
- PR Bennallack, SR Burt, MJ Heder, RA Robison, JS Griffiths. Characterization of a novel plasmid-borne thiopeptide gene cluster in *Staphylococcus epidermidis* strain 115. *J Bacteriol.* 196:4344-50 (2014).
- MB Crook, AL Draper, RJ Guillory, and JS Griffiths. The *Sinorhizobium meliloti* essential porin RopA1 is a target for numerous bacteriophages. *J. Bacteriol.* 195:3663-71 (2013).
- MB Crook, DP Lindsay, MB Biggs, JS Bentley, JC Price, SC Clement, MJ Clement, SR Long, and JS Griffiths. Rhizobial plasmids that cause impaired symbiotic nitrogen fixation and enhanced host invasion. *Mol Plant Microbe In* 25:1026-33 (2012).
- CL Harrison, MB Crook, G Peco, SR Long, and JS Griffiths. Employing site-specific recombination for conditional genetic analysis in *Sinorhizobium meliloti*. *Appl Environ Microbiol* 77:3916-22 (2011).
- RE Carlyon, JL Ryther, RD VanYperen, and JS Griffiths. FeuN, A novel modulator of two-component signaling identified in *Sinorhizobium meliloti*. *Mol Microbiol* 77:170-82 (2010).
- D Wang, JS Griffiths, C Starker, E Federova, E Limpens, S Ivanov, T Bisseling, and SR Long. A nodule specific protein secretory pathway required for nitrogen-fixing symbiosis. *Science* 327:1126-9 (2010).
- TT Steele, CW Fowler, and JS Griffiths. Control of gluconate utilization in *Sinorhizobium meliloti*. *J Bacteriol* 191:1355-8 (2009).
- JS Griffiths, RE Carlyon, JH Erickson, JL Moulton, MJ Barnett, CJ Toman, and SR Long. A *Sinorhizobium meliloti* osmosensory two-component system required for cyclic glucan export and symbiosis. *Mol Microbiol* 69:479-90 (2008).
- JS Griffiths and SR Long. A symbiotic mutant of *Sinorhizobium meliloti* reveals a novel genetic pathway involving succinoglycan biosynthetic functions. *Mol Microbiol* 67:1292-306 (2008).
- BD Barrows, JS Griffiths, RV Aroian. Resistance is non-futile: Resistance to Cry5B in the nematode *Caenorhabditis elegans*. *J Invertebr Pathol* 95:198-200 (2007).

BD Barrows, JS Griffiths, and RV Aroian. *Caenorhabditis elegans* carbohydrates in bacterial toxin resistance. *Methods Enzymol* 417:340-58 (2006).

M Capello, RD Bungiro, LM Harrison, LJ Bischof, JS Griffiths, BD Barrows, RV Aroian. A purified *Bacillus thuringiensis* crystal protein with therapeutic activity against the hookworm parasite *Ancylostoma ceylanicum*. *Proc Natl Acad Sci USA*. 103:15154-9 (2006).

JS Griffiths, SM Haslam, T Yang, S Garczynski, B Mulloy, PS Cremer, A Dell, MJ Adang and RV Aroian. Glycolipids as receptors for *Bacillus thuringiensis* Crystal toxin. *Science* 307:922-5 (2005).

JS Griffiths and RV Aroian. Many roads to resistance: How invertebrates adapt to Bt toxins. *Bioessays* 27:614-24 (2005).

DL Huffman, LJ Bischof, JS Griffiths, RV Aroian. Pore worms: Using *Caenorhabditis elegans* to study how bacterial toxins interact with their target hosts. *Int J Med Microbiol* 293:599-607 (2004).

JS Griffiths, DL Huffman, JL Whitacre, BD Barrows, LD Marroquin, R Muller, JR Brown, T Hennet, JD Esko and RV Aroian. Resistance to a bacterial toxin is mediated by removal of a conserved glycosylation pathway required for toxin-host interactions. *J Biol Chem* 278:45594-602 (2003).

JS Griffiths, JL Whitacre, DE Stevens and RV Aroian. Bt toxin resistance from loss of a putative carbohydrate-modifying enzyme." *Science* 293:860-4 (2001).

LD Marroquin, D Elyassnia, JS Griffiths, JS Feitelson and RV Aroian. "*Bacillus thuringiensis* (Bt) toxin susceptibility and isolation of resistance mutants in the nematode *Caenorhabditis elegans*." *Genetics* 155:1693-9 (2000).

SR Cutler, DW Ehrhardt, JS Griffiths, and CR Somerville. Random GFP::cDNA fusions enable visualization of subcellular structures in cells of *Arabidopsis* at a high frequency. *Proc Natl Acad Sci* 97:3718-23 (2000)

PRESENTATIONS

Invited speaker: "Teaching microbiology up close, from afar." ASM Intermountain Branch Meeting, Weber State University (2020).

Invited speaker: "The Illusion of cooperation in the legume-rhizobium symbiosis." Department of Bacteriology, University of Wisconsin-Madison (2019).

Poster: "Thiopeptide processing: Enzymology that is both highly specific and remarkably relaxed." Wind River Conference on Prokaryotic Biology, Estes Park CO (2019).

Invited speaker: “The illusion of cooperation in the legume-rhizobium symbiosis” Gordon Research Conference on Microbial Stress Response, South Hadley MA (2018).

Invited speaker: “A peptide-based dialogue controlling symbiotic compatibility.” North American Symbiotic Nitrogen Fixation Conference, Winnipeg, Manitoba, Canada (2018).

Invited Speaker: “The illusion of cooperation in the legume-rhizobium symbiosis.” AgBiome, Inc. Research Triangle Park, NC (2017).

Invited Speaker: “Pathway analysis: Reviewing and reconsidering how I conduct science at BYU” BYU Microbiology and Molecular Biology Department Seminar (2017).

Invited Speaker: “Plant-bacterial interactions.” UK/US Workshop on Plant Health, British Embassy, Washington DC (2016).

Invited Speaker: “How rhizobial accessory plasmids impact symbiotic negotiations” MPMI International Congress, Portland OR (2016).

Invited Speaker: “Modulation of symbiotic compatibility by a rhizobial peptidase.” USDA Project Director Meeting, San Diego, CA (2016).

Invited Speaker: “Nature-inspired engineering of peptide antibiotics.” ASM Branch Meeting, University of Utah (2016).

Invited Speaker: “A Peptide-Based Dialogue Between Legumes and Symbiotic Rhizobia.” ASPB Western Section Meeting, Brigham Young University (2016).

Invited Speaker: “Symbiosis in three dimensions.” New England Symbiosis Workshop, Massachusetts Institute of Technology (2015).

Invited Speaker: “Listening in on symbiotic deliberations between legumes and nitrogen-fixing rhizobia.” University of Massachusetts, Amherst (2015).

Invited Speaker: “A peptide-based symbiotic dialogue between rhizobia and legumes.” University of Massachusetts Medical School (2015).

Invited Speaker: “Getting to Fix: Negotiating compatibility in the legume-rhizobium symbiosis.” Department of Plant Biology, University of Vermont (2014).

Invited Speaker: “Can we program life? Reading, writing, and editing DNA” BYU Honors Great Questions Seminar (2014).

Invited Speaker: “*Sinorhizobium* plasmids that block nitrogen fixation.” Stanford Symbiosis Meeting (Sharon Long Lab 20-year Reunion) (2013).

Invited Speaker: “Understanding Instability in the Rhizobium-Legume Symbiosis.” San Diego State University (2012).

Invited Speaker: “Rules for Symbiotic Matchmaking.” UC Merced Quantitative and Systems Biology Seminar Series (2012).

Invited Speaker: “Bacteria: Harmful or Helpful?” Research Revolutions Seminar Series at the Orem Public Library (2012).

Invited Speaker: “Rhizobium plasmids that impair symbiotic nitrogen fixation and enhance host invasion.” Molecular Genetics of Bacteria and Phages Conference, University of Wisconsin-Madison (2011).

Invited Speaker: “Molecular rules for compatibility between legumes and symbiotic rhizobia.” Utah Valley University (2010).

Invited Speaker: “Determinants of strain-host specificity in the *Sinorhizobium-Medicago* symbiosis.” 21st North American Symbiotic Nitrogen Fixation Conference, University of Missouri (2010).

Invited Speaker: “Determinants of compatibility in the legume-rhizobium symbiosis.” ASM Branch meeting, Provo, UT (2010).

Invited Speaker: “What is Life? How we know what we know about molecular biology.” BYU Honors Program Seminar Series (2010).

“Are we a good match? Determinants of compatibility in the legume-rhizobium symbiosis.” BYU Microbiology and Molecular Biology Department Seminar (2009).

“A novel 3-component system required for cyclic glucan secretion.” 16th International Conference on Nitrogen Fixation, Big Sky, MT (2009).

Invited Speaker: “Marrying the classic and contemporary in microbial genetics.” ASM Conference for Undergraduate Educators, Colorado State University (2009).

Invited Speaker: “Two-component signaling in a mutualistic host-microbe interaction.” Molecular Genetics of Bacteria and Phages, Cold Spring Harbor (2008).

“Transport functions in symbiosis.” 13th International Congress on Molecular Plant-microbe Interactions (2007).

“Transport functions in symbiosis.” 20th North American Symbiotic Nitrogen Fixation Conference (2007).

“Host and microbial contributions to symbiosome function.” 12th International Congress on Molecular Plant-microbe Interactions (2005).

Invited Speaker: “Insights on Cry toxin mechanism of action.” Carnegie Institution of Washington, Department of Plant Biology (2004).

Featured Graduate Student Speaker: “Prelude to intoxication: How a bacterial pore-forming toxin discerns its target.” Annual retreat for the UC San Diego Division of Biological Sciences (2003).

Invited Speaker: “Glycosyltransferases mediate Bt toxin action in *C. elegans*.” 35th meeting of the Society for Invertebrate pathology (2002).

Invited Speaker: “Glycosyltransferases mediate Bt toxin action in *C. elegans*.” West Coast *C. elegans* Meeting (2002).

Invited Speaker: “Loss of a putative carbohydrate-modifying enzyme leads to Bt toxin resistance in *C. elegans*.” 34th meeting of the Society for Invertebrate Pathology (2001).

“Bt toxicity through a genetic lens: bre-5 and carbohydrate modification.” International *C. elegans* meeting (2001).

“Studies on the nematicidal *Bacillus thuringiensis* toxins.” West Coast *C. elegans* meeting (2000).

CURRENT FUNDING

RUI: Collaborative Research: Genetic and ecological drivers of microbial adaptation to high-nickel serpentine soils

PI: Joel Griffitts (BYU)

NSF IOS-1755446

Funding Amount: \$276,838

Start Date: Aug 15, 2018

End Date: Jul 31, 2021 (will be extended)

The structural basis of spatially constrained enzymatic promiscuity

PI: Joel Griffitts (BYU)

NIH 1R15GM132852-01

Funding Amount: \$337,500

Start Date: Apr 1, 2019

End Date: Mar 31, 2022 (will be extended)

CURRENT COLLABORATORS

Satish Nair, Yiwu Zheng (U. of Illinois): Enzymatic machinery governing the formation of thiopeptides

Stephanie Porter, Maren Friesen (Washington State University): Evolution of heavy metal tolerance in rhizobia across extreme geological gradients, stability and evolutionary movement of symbiosis islands in mesorhizobia

George diCenzo (Queen's University, Canada): *Sinorhizobium meliloti* metabolic modeling

JC Price (Brigham Young University): Substrate specificity of the thiazole installation machine TcIIJN

Brad Taylor (Brigham Young University): Enzymatic conversion of waste lactose to rare sugars (with grad student Melinda Moss)

David Wingate (Brigham Young University): Computational prediction of peptide antimicrobial activity (with grad student Brandon Atkinson)

Rich Robison (Brigham Young University): Identification of carbapenem resistance determinants from clinical bacterial isolates (with graduate student Taalin Hoj)

TEACHING ACTIVITIES

Courses:

MMBIO 663: Articulating Science (graduate course) (yearly, 2016-present)

MMBIO 661: Molecular Genetics in Practice (graduate course) (yearly, 2009-2019)

MMBIO 662: Genomics, Evolution and Development (graduate course) (2015)

MMBIO 626: Advanced Bacterial Genetics (graduate course) (every other year, 2012-2016)

MMBIO 360: Bacterial Genetics (undergraduate lecture and lab; formerly MMBIO 460) (yearly, 2007-present)

MMBIO 240: Molecular Biology (yearly, 2010-2014)

MMBIO 350: Bacterial Genetics (lecture) (2006)

MMBIO 390R: Pioneers in Molecular Biology (2006, 2012, 2014)

MMBIO 494R: Mentored Research (undergraduate laboratory research mentoring) (2006-present)

HONRS 395R: The Birth of Molecular Biology (2010)

Outreach in science education: I am currently organizing a research/education collaboration with Navajo Technical University (NTU) in New Mexico, with the goal of bringing BYU and NTU students together to solve consequential biological problems. We may establish two tracks: one with a bioinformatic emphasis focused on viral human pathogens, and the second with a wet-bench emphasis focused on antibiotic resistance gene discovery. We hope to launch this program in the latter half of 2021. Previously, I organized the NSF-funded Symbiosis Learning Consortium (SymLC). SymLC involved local high school students and BYU undergraduates in the discovery and characterization of novel isolates of *Sinorhizobium meliloti*, a beneficial soil bacterium that enhances the growth of alfalfa. Our first annual SymLC "Symbiosium" (Dec. 2011) was attended by approximately 90 participants; the second third, and fourth annual Symbiosia (Dec. 2012, 2013, 2014) were attended by approximately 120 participants each,

mostly students from three local high schools. This established an effective model for collaborating with local high schools to investigate diverse biological problems.

Mentoring in the research laboratory: I currently mentor four undergraduates and five graduate students. In all, I have mentored 60 undergraduates, 13 graduate students and 3 postdocs. These young scientists are working on cutting-edge research projects in wide-ranging topics: plant-microbe symbiosis, bacterial metabolic modeling, antimicrobial peptide engineering, optimization of recombinant gene expression technologies, bacterial resistance to antibiotics and heavy metals, and microbial sugar interconversion. Students are expected to produce and present findings of the highest excellence, and to enjoy the challenge of devising new insights into how an understanding of nature can inspire the engineering of life-improving practices and technologies.

CITIZENSHIP ACTIVITIES

Department, College, and University Committees and Appointments:

Chair, Department of Microbiology and Molecular Biology (2020-present)

Overseeing: departmental budgets and financing, hiring, department and personnel performance assessment, protection of students through safety and other training, course offerings and teaching assignments, and supporting BYU aims in all departmental functions.

Member, College of Life Sciences Diversity Committee (College; 2020-present)

The purpose of this committee is to examine our academic environment in the college in terms of how well we attract, nurture, and promote female and minority students, staff, and faculty members, especially in light of our recent climate survey.

Chair, MMBIO Graduate Development Committee (Department; 2012-2020)

As graduate committee chair for the last five years, I have worked to streamline, update, and increase the rigor of MMBIO graduate programs (M.S. and Ph.D.). These efforts have included the development of new curriculum, establishment of more uniform examination procedures, provision for fair mechanisms of student compensation, and creating opportunities for students to interact more at professional and recreational levels.

Member, Graduate Development Committee (Department; 2006-2012)

Prior to being appointed chair of this committee (see above) I worked under Laura Bridgewater and then Rich Robison. Major efforts during that period were aimed at improving graduate coursework curriculum and improving recruitment strategies.

Member, Honors Faculty Council (University; 2011-2015)

Presided over dozens of undergraduate thesis defenses in diverse departments across campus, and regularly worked with the council to evaluate honors courses and to enact major reforms to the university honors program.

College of Physical and Mathematical Sciences Dean Search Committee (University; 2017)

In 2016-2017, the CPMS dean search committee carried out the search and interview process leading to the appointment of Shane Reese and his new leadership team.

Current Topics in Molecular Life Sciences Seminar Series (Interdepartmental; 2008-2013)

The Current Topics in Molecular Life Sciences seminar series brought influential scientists to campus and brought together biologists and chemists in an interdisciplinary venue.

Member, ad hoc ORCA/MEG review committees (College, 2007-present)

Reviewing and rating internal grant proposals submitted by BYU undergraduates (ORCA program,) and faculty (MEG program); most recently in 2014 (MEG review) and 2015 (MEG review).

Citizenship in the Profession

Proposal review for funding agencies:

Medical Research Council (UK) (2008)

Natural Sciences and Engineering Research Council (Canada) (2017)

National Science Foundation/IOS, panelist (2010, 2011, 2012, 2013, 2014, 2015, 2016, 2018, 2019, 2021)

National Institutes of Health (2012)

US Department of Agriculture/NIFA (2013)

Manuscript peer review for journals:

Journal of Bacteriology, Microbiology, Molecular Plant, Applied and Environmental Microbiology, Microbial Ecology, Molecular Microbiology, Journal of Visualized Experiments, PLOS Biology, PLOS One, PLOS Genetics, Proceedings of the National Academy of Sciences USA, Molecular Plant-Microbe Interactions, Scientific Reports, mBio, New Phytologist, Current Opinion in Plant Biology, BMC Microbiology, Viruses, Molecular Genetics and Genomics, Microorganisms, mSystems, Frontiers Microbiology, Genes

Other citizenship activities:

- Treasurer, Intermountain Branch of the American Association for Microbiology (2016-2020)
- President, Intermountain Branch of the American Association for Microbiology (2013-2014)
- Session organizer and chair, International Congress of Molecular Plant-Microbe Interactions (Portland, OR, 2016),
- Expert participant, USA-UK Plant Health Workshop held at the British Embassy in Washington DC (2016)
- Hosting of visiting scholars on the BYU campus. During 2011-2019: Joel Sachs (UC Riverside), Tom Huxford (Sand Diego State), Andy Liwang (UC Merced), Petra Levin (Washington University, St. Louis), David Baltrus (U of Arizona), Dong Wang (UMass Amherst), Eric Schmidt (U of Utah), Josh Price (BYU), Ken Christensen (BYU).
- Visits to other campuses as an invited guest speaker (see CV for invited presentations)
- Visiting scholar during 2015 sabbatical to MIT and Harvard/Mass General Hospital