Blake Wiedenheft

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Education and Profession Experience:

2018-present **Associate Professor, Department of Microbiology and Immunology, Montana State University**
Research: Understanding the mechanisms of RNA-guided gene regulation in bacteria

2012-2018 **Assistant Professor, Immunology and Infectious Disease, Montana State University**

2007-2012 **Postdoctoral Research Scientist, University of California at Berkeley**
Fellowship: Howard Hughes Medical Institute Fellow of the Life Sciences Research Foundation
Advisor: Prof. Jennifer A. Doudna
Project: Structure and function of nucleic acid based adaptive immune systems in bacteria

2002-2006 **PhD student, Montana State University**
Advisors: Profs. Mark Young and Trevor Douglas
Project: *Sulfolobus* as a model for the studying thermal virology and oxidative stress

1993-1998 **Undergraduate Research, Montana State University**
Advisors: Prof. Mark Young
Project: Virus as a constrained reaction vessel for material synthesis.

1997-1998 **Undergraduate Research, University of Oulu, Finland**
Project: Genome sequencing project of *Arabidopsis thaliana*.

Research Statement:

My career has been dedicated to understanding the mechanisms that viruses use to manipulate their hosts and the counter defense systems that microbes employ to defend themselves from infection. As a pre-doctoral fellow my work involved cultivation, isolation, and molecular analysis of viruses that infect hyperthermophilic archaea. My efforts as a PhD student resulted in 15 publications and piqued my interest in the molecular arms race between viruses and their hosts. During my postdoctoral training, I set out to determine the molecular mechanisms of RNA-guided adaptive immunity in *Pseudomonas aeruginosa*. As a postdoctoral fellow of the Life Sciences Research Foundation at UC-Berkeley, I was awarded funding to study adaptive immunity in *P. aeruginosa* from the National Institutes of Health (General Medicine) and the Howard Hughes Medical Institute. Data generated during this support resulted in two patents, 8 manuscripts, and additional funding from National Science Foundation and the Bill & Melinda Gates Foundation. Today, I lead an externally funded research team focused on understanding the evolutionary outcomes of genetic conflict in a wide variety of host/parasite systems.

Awards & Honors

2018 MSU's home coming MVP ("Most Valuable Professor")
2017 Presidential Early Career Award for Scientists and Engineers (PECASE) (https://www.whitehouse.gov/the-press-office/2017/01/09/president-obama-honors-federally-funded-early-career-scientists), (https://loop.nigms.nih.gov/2017/01/qa-with-nigms-funded-pecase-winners/), (http://www.montana.edu/news/16660/msu-professor-wins-prestigious-presidential-award)
2017 "Vice President for Research's Meritorious Technology and Science Award", to recognize MSU faculty members who have made significant technological/scientific contributions which will likely be transferred to the private sector. (http://www.montana.edu/news/16638/msu-to-honor-top-faculty-and-staff)
2017 "Spirit of Discovery Award" for outstanding mentorship of students in the Honors College (http://www.montana.edu/news/16638/msu-to-honor-top-faculty-and-staff)
2016 Finalist for the Burroughs Wellcome Fund - Investigators in the Pathogenesis of Infectious Disease
2016 National Institutes of Health (NIH) Director's Early Career Scientist Award (http://www.montana.edu/news/16054/msu-s-blake-wiedenheft-invited-to-inaugurate-lecture-series-by-director-of-national-institute-of-general-medical-sciences)
2015 Amgen Young Investigator Award
2015 Winner of the student nominated Award for Excellence from the Montana State University Alumni Association and Bozeman Area Chamber of Commerce.
2014 New and Notable Lecturer, Biophysical Society
2013 Invited member of the Faculty of 1000
2013 Kopriva Lecturer
2013 Faculty Excellence Award
2013 Presidential Scholars Showcase Award
2013 Distinguished lecture, International Summer School, Tomsk State University, Russia
2008 Postdoctoral fellow of the Life Sciences Research Foundation - HHMI
2008 National Institutes of Health (NIH), Kirschstein NRSA fellowship – declined
2007 Laboratory Directed Research and Development (LDRD) award
2005 NSF Fellowship, Extremophiles - travel award

Publications *(~6,400 citations, h-index 35)*

1. Wilkinson R, Martin C, Nemudryi A, **Wiedenheft B (2018)** CRISPR RNA-guided autonomous delivery of Cas9. *Nature Structural & Molecular Biology*, (*in press*) DOI: 10.1038/s41594-018-0173-y

2. Bondy-Denomy J, Davidson DR, Doudna JA, Fineran PC, Maxwell KL, Moineau S, Peng X, Sontheimer EJ, and **Wiedenheft B (2018)** A Unified Resource for Tracking Anti-CRISPR Names. *The CRISPR Journal*, 1 (5), DOI: 10.1089/crispr.2018.0043

3. Fang F, Angulo B, Xia N, Sukhwani M, Wang Z, Carey CC, Mazurie A, Cui J, Wilkinson R, **Wiedenheft B**, Irie N, Surani MA, Orwig KE, Reijo PRA. **(2018)** PAX5-OCT4-PRDM1

developmental switch specifies human primordial germ cells. *Nature Cell Biology* 20 (6), 655. doi: 10.1038/s41556-018-0094-3.

4. Borges AL, Zhang JY, Rollins MCF, Osuna BA, **Wiedenheft B**, Bondy-Denomy J. **(2018)** Bacteriophage cooperation suppresses CRISPR-Cas3 and Cas9 immunity AL Borges, *Cell,* 174, 917–925. doi: 10.1016/j.cell.2018.06.013

5. Sebrell TA, Sidar B, Bruns R, Wilkinson RA, **Wiedenheft B**, Taylor PJ, Perrino BA, Samuelson LC, Wilking NJ, Bimczok D. **(2018)** Live imaging analysis of human gastric epithelial spheroids reveals spontaneous rupture, rotation and fusion events. *Cell and Tissue Research*, Feb;371(2):293-307. doi: 10.1007/s00441-017-2726-5.

6. van Erp PBG, Patterson A, Kant R, Berry L, Golden SM, Forsman BL, Carter J, Jackson RN, Bothner B, **Wiedenheft B. (2018)** Conformational Dynamics of DNA Binding and Cas3 Recruitment by the CRISPR RNA-guide Cascade Complex. *ACS Chemical Biology,* Feb 16;13(2):481-490. doi: 10.1021/acschembio.7b00649.

7. Jackson RN, van Erp PBG, Sternberg SH, **Wiedenheft B. (2017)** Conformational regulation of CRISPR-associated nucleases. *Current Opinion in Microbiology*, 37:110–119. doi: 10.1016/j.mib.2017.05.010

8. Rollins MF, Chowdhury S, Carter J, Golden S, Wilkinson R, Bondy-Denomy J, Lander GC, **Wiedenheft B. (2017)** Cas1 and the Csy complex are opposing regulators of Cas2/3 nuclease activity. *PNAS* Jun 27;114(26): E5113-E5121, DOI: 10.1073/pnas.1616395114 (http://www.montana.edu/news/16927/msu-scientists-publish-papers-in-two-scientific-journals-that-advance-understanding-of-how-bacteria-fight-viruses)

9. Chowdhury S, Carter J, Rollins MF, Golden SM, Jackson RN, Hoffmann C, Nosaka L, Bondy-Denomy J, Maxwell KL, Davidson AR, Fischer ER, Lander GC, **Wiedenheft B**, **(2017)** Structure Reveals Mechanisms of Viral Suppressors that Intercept a CRISPR RNA-Guided Surveillance Complex. *Cell* Mar 23;169(1):47-57. doi: 10.1016/j.cell.2017.03.012. (http://www.montana.edu/news/16927/msu-scientists-publish-papers-in-two-scientific-journals-that-advance-understanding-of-how-bacteria-fight-viruses) (https://www.scripps.edu/news/press/2017/20170328lander.html) (http://bpod.mrc.ac.uk/)

10. Bondy-Denomy, J and **Wiedenehft, B (2017)** CRISPR control of virulence in *Pseudomonas aeruginosa*. *Cell Research* 27:163–164. doi:10.1038/cr.2017.6

11. Carter J, Hoffman C, **B Wiedenheft (2017)** The Interfaces of Genetic Conflict Are Hot Spots for Innovation *Cell* 168 (1), 9-11. doi: 10.1016/j.cell.2016.12.007

12. Luo ML., Jackson RN, Denny SR, Tokmina-Lukaszewska M, Maksimchuk KR, Wayne L, Bothner B, **Wiedenheft B**, and Beisel CL **(2016)** The CRISPR RNA-guided surveillance complex in Escherichia coli accommodates extended RNA spacers *Nucleic Acids Res,* Sep 6;44(15):7385-941.

13. Qazi S, Miettinen HM, Wilkinson RA, McCoy K, Douglas T, **Wiedenheft B (2016)** Programmed Self-Assembly of an Active P22-Cas9 Nano Carrier System. *Mol Pharm* 13 (3), 1191-1196

14. Hayes RP, Xiao Y, Ding F, van Erp PBG, Bailey S, **Wiedenheft B**, Ke A **(2016)** Structural basis for promiscuous PAM recognition in Type I-E Cascade from *E. coli Nature 530 (7591), 499-503*

15. Vorontsova D, Datsenko KD, Medvedeva S, Bondy-Denomy J, Savitskaya EE, Pougach K, Logacheva M, **Wiedenheft B**, Davidson A, Severinov K, and Semenova E. **(2015)** Foreign DNA acquisition by the I-F CRISPR–Cas system requires all components of the interference machinery. *Nucleic Acids Res* 43(22) 10848–10860.

16. Carter J, **Wiedenheft B. (2015)** SnapShot: CRISPR-RNA-Guided Adaptive Immune Systems. *Cell* (163)1; 260.

17. Redding S, Sternberg SH, Marshall M, Gibb B, Bhat P, Guegler CK, **Wiedenheft B**, Doudna JA, Greene EC. **(2015)** Surveillance and processing of foreign DNA by the Escherichia coli CRISPR-Cas system *Cell* 163, 854–865

18. Bondy-Denomy J, Garcia B, Strum S, Du M, Rollins MF, Hidalgo-Reyes Y, **Wiedenheft B**, Maxwell KL, Davidson AR. **(2015)** Multiple mechanisms for CRISPR-Cas inhibition by anti-CRISPR proteins. *Nature 529,* 136-139

19. van Erp PB, Jackson RN, Carter J, Golden SM, Bailey S, **Wiedenheft B. (2015)** Mechanism of CRISPR-RNA guided recognition of DNA targets in *Escherichia coli. Nucleic Acids Res* 30;43(17):8381-91 (Featured on the cover)

20. Jackson RN, McCoy AJ, Terwilliger TC, Read RJ, **Wiedenheft B**. **(2015)** X-ray structure determination using low-resolution electron microscopy maps for molecular replacement. *Nature Protocols,* 10(9):1275-1284 *(Featured on the cover)*

21. Jackson RN, and **Wiedenheft B. (2015)** A Conserved Structural Chassis for Mounting Versatile CRISPR RNA-Guided Immune Responses. *Mol Cell.* 28(58): 722–728

22. van Erp PB, Bloomer G, Wilkinson R., **Wiedenheft B. (2015)** The history and market impact of CRISPR RNA-guided nucleases. *Curr Opin Virol* 23(12): 85-90.

23. Rollins MF, Schuman JT, Paulus K, Bukhari HS, **Wiedenheft B. (2015)** Mechanism of foreign DNA recognition by a CRISPR RNA-guided surveillance complex from Pseudomonas aeruginosa. *Nucleic Acids Res* 43(4): 2216-2222

24. Jackson, RN, Golden S M, van Erp PB, Carter J, Westra ER, Brouns SJ, van der Oost J, Terwilliger TC, Read RJ, and **Wiedenheft, B. (2014)** Crystal structure of the CRISPR RNA-guided surveillance complex from *Escherichia coli*. *Science,* 345(6203):1473-1479. *(Featured on the cover, highlighted in a Science Perspective, on the NIH website, recognized by the Faculty of 1000, by the Stanford Synchrotron Radiation Lightsource, and featured as "molecule of the month" by the PDB.)*

25. van der Oost J, Westra ER, Staals R, Jackson R, **Wiedenheft B**. **(2014)** Unraveling the structural and mechanistic basis of CRISPR-Cas systems. *Nature Rev Micro*. 12(7): 479-92.

26. Wilkinson R, **Wiedenheft B**. **(2014)** A CRISPR method for genome engineering.**,** *F1000Prime Report*, 6:3

27. Jackson RN, Lavin M, Carter J, and **Wiedenheft B**, **(2013)** Fitting CRISPR-associated Cas3 in the Helicase Family Tree. *Curr Opin Struc Bio***.** 24: 106–114 *(Featured on the cover)*

28. Westra ER, Semenova E, Kirill DA, Jackson RN, **Wiedenheft B**, Severinov K, Brouns JJ, **(2013)** Type I-E CRISPR-Cas systems discriminate target from non-target DNA through basepairing. *PLOS Genetics* 9(9):e1003742.

29. **Wiedenheft B. (2013)**. In Defense of Phage – Viral Suppressors of CRISPR-mediated Adaptive Immunity in Bacteria. *RNA Biology*, 10(5).

30. Sorek R, Lawrence CM, **Wiedenheft B. (2013)**. CRISPR-mediated Adaptive Immune Systems in Bacteria and Archaea. *Ann Rev Biochem,* 82: 237-266.

31. Duijn Ev, Barbu IM, Barendregt A, Jore MM, **Wiedenheft B**, *et al*. **(2012)** Native Tandem and Ion Mobility Mass Spectrometry highlight Structural and Modular Similarities in CRISPR-associated protein complexes from Escherichia coli and Pseudomonas aeruginosa. *Mol Cell Proteomics*, 11(11): 1430-1441.

32. Sashital DG, **Wiedenheft B**, Doudna JA. **(2012)**. Mechanism of foreign DNA selection in a bacterial adaptive immune system. *Mol Cell* 48: 606-15

33. **Wiedenheft**, **B**., Sternberg, S.H., Doudna, J.A. **(2012)**. RNA-guided genetic silencing systems in bacteria and archaea. *Nature* 482 (7385): 331-8.

34. **Wiedenheft, B.**, Lander, G.C., Zhou, K., Matthijs, J.M., Brouns, S.J.J., van der Oost, J., Doudna, J.A., Nogales, E. **(2011)**. Structures of the RNA-guided surveillance complex from a bacterial immune system. *Nature* 477(7365): 486-9.

35. **Wiedenheft, B**., van Duijn, E., Bultema, J.B., Waghmare, S.P., Zhou, K., Barendregt, A., Westphal, W., Heck, A.J.R., Boekema, E.J., Dickman, M. J, Doudna, J.A. **(2011)**. An RNA-guided complex from a bacterial immune system enhances target recognition through seed sequence interactions. *PNAS* 108 (25) 10092-10097.

36. Jore, M. M., Lundgren, M., van Duijn, E., Bultema, J. B., Waghmare, S. P., **Wiedenheft, B.,** Beijer, M. R., Barendregt, A., Zhou, K., Snijders, A. P. L., Dickman, M. J., Doudna, J. A., Boekema, E. J., Heck, A. J. R., van der Oost, J, Brouns, S. J.J. **(2011)**. Structural basis for CRISPR RNA-guided DNA recognition by Cascade. *Nature Structural & Molecular Biology.* 18, 529-536.

37. Haurwitz, R. E., Jinek, M., **Wiedenheft, B.**, Zhou, K., Doudna, J. A. **(2010)**. Sequence- and structure-specific RNA processing by a CRISPR endonuclease. *Science* 329(5997): 1355-1358.

38. **Wiedenheft, B.**, Zhou, K., Jinek, M., Coyle, S.M., Ma, W., Doudna, J.A. **(2009)**. Structural basis for DNase activity of a conserved protein implicated in CRISPR-mediated antiviral defense. *Structure* (17): 904–912.

39. Maaty, W.S., **Wiedenheft, B.**, Heinemann, J., Tarlykov, P., Robison-Cox, J., Schaff1, N., Valenzuela, J., Dillman, A., Blum, P., Douglas, T*., et al.* **(2009)**. Something old, something new, something borrowed; how the thermoacidophilic archaeon Sulfolobus solfataricus responds to oxidative stress. *PLoS ONE* 4(9): e6964.

40. Snyder, J.C., **Wiedenheft, B.**, Lavin, M., Roberto, F.F., Spuhler, J., Ortmann, A.C., Douglas, T., and Young, M. **(2007)**. Virus movement maintains local virus population diversity *PNAS 104*, 19102-19107.

41. **Wiedenheft, B.**, Flenniken, M.L., Allen, M.A., Young, M., and Douglas, T. **(2007)**. Bioprospecting in high temperature environments; application of thermostable protein cages. *Soft Matter 3*, 1091-1098.

42. Gauss, G.H., Benas, P., **Wiedenheft, B.**, Young, M., Douglas, T., and Lawrence, C.M. **(2006)**. Structure of the DPS-like protein from Sulfolobus solfataricus reveals a bacterioferritin-like dimetal binding site within a DPS-like dodecameric assembly. *Biochemistry 45*, 10815-10827.

43. Maaty, W.S.A., Ortmann, A.C., Dlakic, M., Schulstad, K., Hilmer, J.K., Liepold, L., **Wiedenheft, B.**, Khayat, R., Douglas, T., Young, M.J., and Bothner, B. **(2006)**. Characterization of the archaeal thermophile Sulfolobus turreted icosahedral virus

validates an evolutionary link among double-stranded DNA viruses from all domains of life. *Journal of Virology* *80*, 7625-7635.

44. Ortmann, A., **Wiedenheft, B.**, Douglas, T., and Young, M. **(2006)**. Hot Archaeal Viruses Reveal Deep Connections *Nat Rev Micro* *4*, 520-528.

45. Ramsay, B., **Wiedenheft, B.**, Allen, M., Gauss, G.H., Lawrence, C.M., Young, M., and Douglas, T. **(2006)**. Dps-like protein from the hyperthermophilic archaeon Pyrococcus furiosus. *Journal of Biological Inorganic Chemistry* *100*, 1061–1068.

46. **Wiedenheft, B.**, Mosolf, J., Willits, D., Yeager, M., Dryden, K.A., Young, M., and Douglas, T. **(2005)**. An archaeal antioxidant: Characterization of a Dps-like protein from Sulfolobus solfataricus. *PNAS* *102*, 10551-10556 *(Featured on the cover)*

47. Young, M., **Wiedenheft, B.**, Snyder, J., Spuhler, J., Roberto, F., and Douglas, T. **(2005)**. Geothermal Biology and Geochemsitry in Yellowstone National Park. *Montana State University Extension Press*.

48. Kraft, P., Kummel, D., Oeckinghaus, A., Gauss, G.H., **Wiedenheft, B.**, Young, M., and Lawrence, C.M. **(2004a)**. Structure of D-63 from sulfolobus spindle-shaped virus 1: Surface properties of the dimeric four-helix bundle suggest an adaptor protein function. *Journal of Virology* *78*, 7438-7442.

49. Snyder, J.C., Spuhler, J., **Wiedenheft, B.**, Roberto, F.F., Douglas, T., and Young, M.J. **(2004)**. Effects of culturing on the population structure of a hyperthermophilic virus. *Microbial Ecology* *48*, 561-566. *(Featured on the cover)*

50. Kraft, P., Oeckinghaus, A., Kummel, D., Gauss, G.H., Gilmore, J., **Wiedenheft, B.**, Young, M., and Lawrence, C.M. **(2004b)**. Crystal structure of F-93 from Sulfolobus spindle-shaped virus 1, a winged-helix DNA binding protein. *Journal of Virology* *78*, 11544-11550.

51. **Wiedenheft, B.**, Stedman, K., Roberto, F., Willits, D., Gleske, A.K., Zoeller, L., Snyder, J., Douglas, T., and Young, M. **(2004)**. Comparative genomic analysis of hyperthermophilic archaeal Fuselloviridae viruses. *Journal of Virology* *78*, 1954-1961.

52. Snyder, J.C., Stedman, K., Rice, G., **Wiedenheft, B.**, Spuhler, J., and Young, M.J. **(2003)**. Viruses of hyperthermophilic Archaea. *Research in Microbiology* *154*, 474-482.

53. Rice, G., Stedman, K., Snyder, J., **Wiedenheft, B.**, Willits, D., Brumfield, S., McDermott, T., and Young, M.J. **(2001)**. Viruses from extreme thermal environments. *PNAS* *98*, 13341-13345.

Current and complete bibliography available at https://scholar.google.com/wiedenheft

Invited Seminars

01/28/2018 "Evolutionary outcomes of CRISPR-anti-CRISPR conflict" **Future in Biotechnology, Saint Petersburg, Russia**

10/06/2018 "Evolutionary outcomes of CRISPR-anti-CRISPR conflict" **Helmholtz Institute for RNA-based Infection Research (HIRI) in Würzburg, Germany**

11/01/2018 "Evolutionary outcomes of CRISPR-anti-CRISPR conflict" **CSHL: Transposable elements, Cold Spring Harbor, NY**

10/06/2018 "DNA surgery for Curing Genetic Disease" **MSU Research Symposium, Bozeman MT**

10/3-5/2018 "DNA surgery for Curing Genetic Disease" **MSU Roadshow, MT high line**

09/20/2018 "DNA surgery for Curing Genetic Disease" **MSU 10x10, Bozeman, MT**

07/22/2018 "Evolutionary outcomes of CRISPR-anti-CRISPR conflict" **FASEB: Virus assembly, Steamboat, CO**

07/16/2018 "CRISPR RNA-guided immune response to viruses that infect bacteria" **Mount Holyoke, South Hadley, MA**

07/15/2018 "Viral DNA induced activation of the CRISPR RNA-guided nuclease" **Gordon Conference on Microbial Stress, South Hadley, MA**

06/25/2018 *A CRISPR immune response to viruses that infect bacteria*" **FASEB Genes and Machines, Snowmass, CO**

06/21/2018 "*A CRISPR immune response to viruses that infect bacteria*" **CRISPR 2018, Vilnius Lithuania**

06/18/2018 "*A CRISPR immune response to viruses that infect bacteria*" **Gordon Research Conference on Microbial Stress Response, South Hadley, MA**

04/17/2018 "*A CRISPR immune response to viruses that infect bacteria*" **Department of Biochemistry and Molecular Biology, Rutgers University, NJ**

04/03/2018 "*A CRISPR immune response to viruses that infect bacteria*" **Washington University School of Medicine, St. Louis, MO**

03/16/2018 "*A CRISPR immune response to viruses that infect bacteria*" **National Center for Genome Resources, Santa Fe, NM**

02/21/2018 "*Evolutionary Outcomes of CRISPR-anti-CRISPR Conflict*" **Amgen, San Francisco, CA**

02/17/2018 "*Evolutionary Outcomes of CRISPR-anti-CRISPR Conflict*" **Innovation Road Show in Celebration of MSU 125th Anniversary, MT**

02/05/2018 "A New Method of DNA Surgery Promises to Cure Genetic Disease", **WonderLust, Bozeman MT**

01/15/2018 "*CRISPR Systems: Where they came from how they work and how they will impact Ag*" **College of Agriculture Connects, Montana State University, MT**

10/22/2017 "*A CRISPR immune response to viruses that infect bacteria*" **Cell Symposia on CRISPR: From Biology to Technology and Novel Therapeutics, Sitges Spain**

10/17/2017 "*A CRISPR immune response to viruses that infect bacteria*" **Skolkovo Institute of Science and Technology, Moscow, Russia**

10/06/2017 "*A CRISPR immune response to viruses that infect bacteria*" **University of Delft, Netherlands**

09/08/2017 "*A CRISPR immune response to viruses that infect bacteria*" **American Society for Bone and Mineral Research (ASBMR), Denver, CO**

08/18/2017 "*A CRISPR immune response to viruses that infect bacteria*" **Re-writing Genomes: A New Era in Genome Engineering, Berkeley CA (https://innovativegenomics.org/news/fifth-rewriting-genomes-symposium/)**

07/21/2017 "*A CRISPR immune response to viruses that infect bacteria*" **Genome Engineering – The CRISPR/Cas Revolution meeting, Cold Spring Harbor Laboratory, NY**

06/15/2017 "*A CRISPR immune response to viruses that infect bacteria*" **Oklahoma University, Norman OK**

05/29/2017 "*Evolutionary Outcomes of CRISPR-anti-CRISPR Conflict*" **Horizon Discovery, Vienna Austria**

05/24/2017 "*Evolutionary Outcomes of CRISPR-anti-CRISPR Conflict*" **12th Microsymposium on Small RNAs, Vienna Austria**

04/19/2017 "*DNA Surgery for Curing Genetic Diseases*" **Gallatin Valley Friends of the Sciences, Museum of the Rockies, Bozeman MT**

04/13/2017 "*A CRISPR immune response to viruses that infect bacteria*" **Portland State University, Portland OR**

04/03/2017 "*A CRISPR immune response to viruses that infect bacteria*" **Caribou Biosciences, Berkeley CA**

04/02/2017 "*A CRISPR immune response to viruses that infect bacteria*" **American Chemical Society, Goodman Symposium in honor of Jennifer Doudna, San Francisco CA**

03/22/2017 *"Bacterial CRISPR immune systems and viral subversion systems*" **Center for Biofilm Engineering, Montana State University, Bozeman MT**

03/16/2017 "*Bacteria, their Viruses, and How They Taught us to Perform Genome Surgery*" **Flathead Community College, Kalispell MT**

03/02/2017 "*A CRISPR immune response to viruses that infect bacteria*" **The Scripps Research Institute (TSRI), Jupiter FL**

01/27/2017 "*A CRISPR immune response to viruses that infect bacteria*" **Duke University, Durham NC**

12/04/2016 *"Molecular scalpels that protect Bacteria from viral infection are repurposed for surgical repair of genetic diseases"* **Session Speaker at the National Academy of Sciences' fifteenth Japanese-American Kavli Frontiers of Science symposium. National Academy of Sciences Arnold and Mabel Beckman Center, Irvine CA**

09/01/2016 "*A CRISPR immune response to viruses that infect bacteria*" **University of Washington, Seattle WA**

09/01/2016 *"The Big Impact of Small Machines"* **Freshman Research Symposium, Bozeman MT**

09/01/2016 "*A CRISPR immune response to viruses that infect bacteria*" **University of Illinois at Urbana-Champaign IL**

08/10/2016 "*Molecular vaccines that protect Bacteria from viral infection"* **Rocky Mountain National Lab, Hamilton MT**

06/19/2016 "*A CRISPR immune response to viruses that infect bacteria*" **American Society of Virology, Virginia Tech, Blacksburg VA**

05/24/2016 "*The best offense is a good defense: understanding genetic conflict at near-atomic resolution*" **CRISPR Conference 2016, The Weizmann institute of Science, Rehovot, Israel**

04/22/2016 "*Molecular vaccines that protect Bacteria from viral infection*" **Hilleman Symposium, Montana State University Bozeman MT**

04/14/2016 "*A CRISPR immune response to viruses that infect bacteria*" **Lambda Lunch, National Institutes of Health, DC**

04/13/2016 "*Bacteria, Their Viruses, and How They Taught Us to Perform Genome Surgery"* ***NIGMS Director's Early Career Scientist Lecture*****, National Institutes of Health, DC**

04/07/2016 "*A CRISPR immune response to viruses that infect bacteria*" **Molecular Machines Symposium, University of Georgia Athens, GA**

03/23/2016 "*CRISPR RNA-guide detection and destruction of invading DNA*" **University of Denver, Denver CO**

01/27/2016 "*A CRISPR immune response to viruses that infect bacteria*" **University of Chicago, Chicago IL**

12/05/2015 "Structures of *RNA-guided search and destroy machines***" Regulating with RNA in Bacteria and Archaea. Cancun, Mexico.**

11/26/2015 "*A CRISPR immune response to viruses that infect bacteria*" **Cold Spring Harbor Asia conference on Development and Pathophysiology of the Respiratory System. Suzhou, China**

10/27/2015 "*A CRISPR immune response to viruses that infect bacteria*" **Ohio State University, Columbus OH**

10/14/2015 "*A CRISPR immune response to viruses that infect bacteria*" **Amgen Young Investigator Symposium, Broad Institute, Cambridge MA**

09/12/2015 "Structure and function of RNA-guided foreign DNA surveillance machines" **Keynote: Biomolecular Structure and Dynamics Symposium, Missoula MT**

06/19/2015 "The Dynamics of CRISPR RNA-guided Detection of Invading DNA" **Keynote: CRISPR conference, Rockefeller University NY**

06/09/2015 "*Structures Guided Insight into Mechanisms of RNA-guided Surveillance of Foreign DNA*" **The 19th Conversation, University of Albany NY**

05/17/2015 "*A CRISPR immune response to viruses that infect bacteria*" **Keynote: Virus Assembly, Dubrovnik, Croatia**

04/10/2015 "*A CRISPR immune response to viruses that infect bacteria*" **Dept. Microbiology, University of Wisconsin–Madison WI**

04/02/2015 "*Basic Research on Bacterial Immunity Forges Frontier in Genome Engineering"* **Rocky Mountain National Lab, Hamilton MT.**

03/26/2015 "*A CRISPR immune response to viruses that infect bacteria*" **Dept. Microbiology, University of Massachusetts Amherst MA**

03/19/2015 "*A CRISPR immune response to viruses that infect bacteria*" **Evnin Seminars in Chemical and Structural Biology, Rockefeller University NY**

02/09/2015 "*RNA-guided surveillance of invading DNA in Bacteria***" Dept. Molecular Structure & Function, Hospital for Sick Kids, Toronto Canada**

01/30/2015 "*A CRISPR immune response to viruses that infect bacteria*" **Synthetic Genomics Institute, San Diego CA**

01/26/2015 "*RNA-guided surveillance of invading DNA in Bacteria*" **Gordon Research Conference - Physical Virology, Ventura CA**

10/10/2014 "*X-ray structure of the CRISPR RNA-guided surveillance complex*" **Antiviral Defense Symposium, Wageningen University, Netherlands**

10/08/2014 **Keynote** "*A CRISPR immune response to viruses that infect bacteria*" **Dutch Molecular Genetics Society, Wageningen University, Netherlands**

09/24/2014 *RNA-guided surveillance of invading DNA in Bacteria*" **Dept. of Pathology & Microbiology, University of Nebraska Medical Center, Omaha NE**

08/26/2014 "*A CRISPR immune response to viruses that infect bacteria*" **Dept. Biology and Biomedical Engineering, Georgia Tech GA**

05/14/2014 "*RNA-guided Cellular Surveillance*" **Second annual European CRISPR conference. Berlin, Germany**

03/11/2014 **"***Mechanisms of adaptive immunity in bacteria"* **University of British Colombia, Vancouver, Canada**

03/27/2014 "*A CRISPR immune response to viruses that infect bacteria*" **Dept. of Biochemistry, University of Iowa IA**

02/20/2014 "*Understanding Mechanisms of RNA-guided Adaptive Immunity in Bacteria*" **Departmental seminar Microbiology, University of Alabama at Birmingham**

02/16/2014 "*Structure of the CRISPR RNA-guided surveillance complex from the adaptive immune system in Escherichia coli"* **New and Notable lecture at the Biophysical Society Conference, San Francisco CA**

02/03/2014 "*CRISPR RNA-guided detection of invading DNA"* **Dept. of Cellular, Molecular, and Microbial Biology, Missoula, MT**

01/24/2013 "*CRISPR RNA-guided Machines that Respond to Viral Infections in Bacteria*" **Departmental seminar Chemistry and Biochemistry, Montana State University, Bozeman MT**

11/12/2013 "*A CRISPR immune response to viruses that infect bacteria*" **Kopriva lecture, Montana State University, Bozeman MT**

10/07/2013 "*RNA-guided Adaptive Immunity in Bacteria*" **Awarded Best Talk of Session, Third Biennial Western Regional IDeA Conference, Honolulu HI**

09/24/2013 "*RNA-guided Adaptive Immunity in Bacteria*" **Departmental seminar Microbiology, University of Alabama at Birmingham AB**

07/04/2013 "*A CRISPR Molecular Record for Documenting Dynamic Environmental Change."* **Earth and Environmental Science School, Tomsk State University, Russia**

06/17/2013 "*Finding Your Foe: RNA-guided Cellular Surveillance*" **Biochemical Society Focused Meeting CRISPR: evolution, mechanisms and infection. St Andrews University, United Kingdom**

06/11/2013 "*Finding Your Foe: RNA-guided Cellular Surveillance*" **2nd KIAS Conference on Subcellular Dynamics. Seoul, Korea**

04/25/2013 "*RNA-guided Adaptive Immunity in Bacteria*" **New England Biolabs, Boston, MA**

06/11/2013 "*CRISPR-control of gene expression*" **TechLInk Center, A DoD initiative to advance new technologies, Bozeman MT**

02/08/2013 "*RNA-guided Surveillance Systems Required for Adaptive Immunity in Bacteria*" **Department of Biochemistry, Gonzaga University, Spokane WA**

11/07/2012 "*RNA-guided Surveillance Systems Required for Adaptive Immunity in Bacteria*" **CNRS - Jacques Monod Conference, RNA: a key to coordination of gene expression. Roscoff, France**

10/31/2012 "*RNA-guided Surveillance Systems Required for Adaptive Immunity in Bacteria*" **AMI Group Scripps Research Institute, San Diego CA**

10/05/2012 "*RNA-guided Adaptive Immune System in Bacteria*" **Department of Microbiology, Bozeman MT**

07/23/2012 "*RNA-guided Adaptive Immune System in Bacteria*" **Northwest Crystallography Conference, Bozeman MT**

09/11/2011 "*RNA-guided Adaptive Immune System in Bacteria*" **Department of Immunology and Infectious Diseases, Montana State University, Bozeman MT**

08/23/2011 "*RNA-guided Adaptive Immune System in Bacteria*" **Gordon Conference on Nucleic Acids Research, Biddeford ME**

06/27/2010 "*RNA-guided Adaptive Immune System in Bacteria*" **FASEB on Virus Structure & Assembly, Saxton River VT**

Service

Public Service and Community Outreach:

Participation in MSUs 10x10 (http://www.montana.edu/news/17991/from-avalanches-to-westerns-msu-s-10x10-innovation-road-show-will-highlight-faculty-research)

Participation in the MUS road show visiting 7 locations across the highline in 3 days (https://mus.edu/roadshow/)

Participation in NSF Building Biology (http://www.montana.edu/news/17886/public-forum-exploring-the-science-and-ethics-of-gene-editing-set-for-aug-7)

Interviewed on an episode of Montana Ag Live (PBS) that was later covered by the New York Times (https://www.nytimes.com/2018/09/17/opinion/bugs-weeds-gophers-a-trump-tv-antithesis-tackles-real-problems.html)

Invited lecture "DNA Surgery for Curing Genetic Diseases" Anaconda Rotary Club, Anaconda MT (09/04/2018), Terry LaValley

Created figures for a "graphic novel" entitled "Rock, Paper, Scissors - when microbes play games". The educational booked was supported by grants to Mariann Landsberger, a graduate student, who spearheaded the project.

Featured in a promotional video for MSU health sciences https://www.youtube.com/watch?v=y3AGCKP9RNw&feature=youtu.be

Invited lecture, “DNA Surgery for Curing Genetic Diseases” for the Gallatin Valley Friends of the Sciences, at the Museum of the Rockies, Bozeman MT (4/19/2017)

Invited speaker for a community outreach project at the Flathead Community College. Lecture entitled “Bacteria, their Viruses, and How They Taught us to Perform Genome Surgery” (https://www.fvcc.edu/event/fvcc-honors-symposium-lecture-series-bacteria-viruses-taught-us-perform-genome-surgery/)

NIH Director’s Early Career Scientist Lecture –recognition of commitment to training and outreach – webcast (https://videocast.nih.gov/) to over 4,000 undergraduate students at campuses around the US. This lecture was featured on the NIH Biomedical Beats website (https://biobeat.nigms.nih.gov/2016/04/finding-adventure-blake-wiedenhefts-path-to-gene-editing/).

Collaborated with the NIH on an IDeA video to promote research in underfunded states https://www.youtube.com/watch?v=WE9JFZGksm4

Collaborated with an NIH-sponsored media company to create an educational profile about the people doing biomedical research (http://www.labtv.com/Home/Channels?instituteId=1803)

Founder of the “Montana Wild Virus Hunt”. This program engages Native American high school students and teachers in a hands-on virology workshop at Montana State University.

Instructor for the Crow Education Partnership Program. This program provides science enrichment activities for ten, 4th grade classrooms and professional development for their teachers in three schools located on and adjacent to the Crow Reservation in Southwestern Montana. My students isolated and visualized viruses using electron microscopy.

Mentor for MEPI (Middle Eastern Partnership Initiative), a U.S. Department of State-sponsored summer training program that facilitates a dialog focused on human rights.

Educational interview on CRISPRs for Epigene (https://epigenie.wistia.com/medias/fyp44izz96)

Interview and cited by the New York Times http://www.nytimes.com/2015/11/15/magazine/the-crispr-quandary.html?_r=0

Interview and cited in NEW FOCUS published in *Science* http://www.sciencemag.org/content/341/6148/833.full

International Service:

Invited external PhD examiner for PhD defense of Olga Musharova (Skolkovo Institute of Science and Technology, Moscow, Russia)

Invited external PhD examiner for PhD defense of Sergey Shmakov (Skolkovo Institute of Science and Technology, Moscow, Russia)
Referee for the The Leverhulme Trust (https://www.leverhulme.ac.uk/)
Organizer of the 2017 international CRISPR conference (https://tofu.msu.montana.edu/cs/crispr_2017, https://naturemicrobiologycommunity.nature.com/users/6661-michael-chao/posts/17815-crispr-2017-conference?utm_content=buffer2bbcf&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer)
Invited external PhD examiner for PhD defense of Tim Kunne (Wageningen University, Netherlands)
Invited external PhD examiner for PhD defense of Luuk Loeff (Delft University, Netherlands)
Ad-hoc grant reviewer: *Programme Strategic Scientific Alliances between China and the Netherlands (PSA)*
Ad-hoc grant reviewer: Wellcome Trust
Ad-hoc grant reviewer: The Netherlands Organization for Scientific Research (NWO)
Student invited panelist for the 2015 Physical Virology Gordon Research Seminar (GRS).
NIH sponsored LabTv media highlighting research in the Wiedenheft Lab (2015). (https://www.youtube.com/embed/ZW9EEGrBgYM?feature=plcp&rel=0&showinfo=0&autoplay=1)
Ad-hoc grant reviewer: European Research Council, 2013
Contributing member of the Faculty of 1000 Biology (by invitation) 2012 - present

Journal Referee Activity:

Board of Editing Reviewers for *eLife*
Editorial board member of *The CRISPR Journal* (New in 2017)
Strategic advisory board*, Faculty of 1000 Research*
Ad-hoc reviewer, *Communications Biology*
Ad-hoc reviewer, *Science*
Ad-hoc reviewer, *Nature*
Ad-hoc reviewer, *Nature Structural and Molecular Biology*
Ad-hoc reviewer, *Cell*
Ad-hoc reviewer, *Cell Reports*
Ad-hoc reviewer, *Cell Research*
Ad-hoc reviewer, *Nature Microbiology*
Ad-hoc reviewer, *Molecular Cell*
Ad-hoc reviewer, *EMBO Journal*
Ad-hoc reviewer, *Proceedings of the National Academy of Science*
Ad-hoc reviewer, *Nucleic Acids Research*
Ad-hoc reviewer, *Nature Communications*
Ad-hoc reviewer, *Nature Reviews Microbiology*
Ad-hoc reviewer, *Structure*

Ad-hoc reviewer, *Biochemical Journal*
Ad-hoc reviewer, *Journal of Molecular Biology*
Ad-hoc reviewer, *RNA Biology*
Ad-hoc reviewer, *PlosOne*
Ad-hoc reviewer, *FEBS Journal*
Ad-hoc reviewer, *Genes & Development*
Ad-hoc reviewer, *Genome Biology and Evolution*
Ad-hoc reviewer, *Current Opinions in Structural Biology*

University Service:

2018 Search Committee for Dean of the Graduate School
2018 Search Committee for faculty in Microbiology and Immunology
2018 Committee for MSU Research Expansion Funds
2018 Presenter at the MSU 10x10 at the Ellen theater
2018 Presenter for the MSU Roadshow (bus tour across the Montana high line)
2018 Research Counsel
2018 Radiation Safety Committee
2018 Institutional Biosafety Committee (IBC)
2017 Reviewer for the Charles and Nora Wiley Faculty Award for Meritorious Research
2017 Reviewer for the The Vice President for Research Meritorious Technology/Science Award
2017 Reviewer for the Spirit of Discovery Award
2017 Research Counsel
2017 Radiation Safety Committee
2017 Institutional Biosafety Committee (IBC)
2017 Table facilitator for the MSU diversity summit (phase II)
2017 Table facilitator for the MSU diversity summit (phase I)
2017 Faculty Search committee for Plant Sciences (Vice Martin)
2016 President appointed facilitator for the MSU Diversity and Inclusion Plan
2016 Presidential Scholarship Committee
2016 Co-organizer of the Maurice Hilleman Symposium on Vaccines
2016 Radiation Safety Committee
2016 Institutional Biosafety Committee (IBC)
2016 Equity Advocate
2016 Faculty Senate Representative
2016 Faculty Search committee for Microbiology and Immunology
2015 Participant in the Freshman Research Symposium (Organized by Ilse-Mari Lee)
2015 Radiation Safety Committee
2015 Institutional Biosafety Committee (IBC)
2014 *Ad-hoc* reviewer, for the Undergraduate Scholars Program (Director Colin Shaw)
2014 Participant in the Freshman Research Symposium (Organized by Ilse-Mari Lee)
2014 Institutional Biosafety Committee (IBC)
2014 Founder and organizer of the campus wide “Early Stage Investigators” program.
2014 Faculty Senate Representative for the Department of Microbiology and Immunology

2014 Search committee, VP and Dean for the College of Ag
2014 Search committee, Department Head for Microbiology and Immunology
2014 Chair of the Radiation Safety Committee
2014 Equipment Fee Allocation Committee (EFAC)
2014 MSU Advance Equity advocate (committee to advance diversity on campus)
2014 Arnold & Mabel Beckman Foundation Undergraduate Research Mentor
2013 *Ad-hoc* reviewer, for the Undergraduate Scholars Program (Director Colin Shaw)
2013 Participant in the Freshman Research Symposium (Organized by Ilse-Mari Lee)
2013 Institutional Biosafety Committee (IBC)
2013 Search committee, Assistant Professor in Immunology and Infectious Diseases
2013 Faculty Senate Representative
2013 Established campus wide monthly meeting for research active "Early Stage Investigators" at Montana State University.
2013 Founder of the "Montana Wild Virus Hunt." This program aims to engage high school students and teachers in a summer workshop at Montana State University. The workshop focuses on laboratory techniques in virology.
2013 Equipment Fee Allocation Committee (EFAC)
2012 Radiation Safety Committee
2012 Reviewer for the Undergraduate Scholars Program

Departmental Service

2017 Search committee for new faculty in Plant Sciences
2017 Departmental Scholarship/Award Selection Committee
2016 Departmental Scholarship/Award Selection Committee
2016 Faculty Senate Representative
2016 Co-organizer of the Hilleman Symposium
2015 Faculty Senate Representative
2015 Selection Committee for Environmental Microbiology Faculty Search
2014 Scholarship/Faculty Award Committee
2014 Faculty Senate Representative for the Department of Microbiology and Immunology
2014 Co-organizer of the Microbiology and Immunology departmental seminar series
2014 Co-organizer of the Research in progress talk for the Dept. of Microbiology and Immunology
2013 Selection committee for the Pre-Veterinary & Veterinary Scholarships
2013 Co-organizer of the Dept. of Microbiology and Immunology graduate student Journal club
2013 Faculty Senate Representative for the Department of Microbiology and Immunology
2013 Co-organizer of the Microbiology and Immunology departmental seminar series
2013 Co-organizer of the Research in progress talk for the Dept. of Microbiology and Immunology
2013 Co-organizer of the Dept. of Microbiology and Immunology Journal club
2012 Faculty Senate Representative for the Department of Immunology and Infectious Diseases

Mentoring Experience

Postdoctoral Fellows Advised:
Dr. Артем Немудрый
Dr. Anna Nemudraia
Dr. Andrew Santiago-Frangos
Dr. Emma Kate Loveday
Dr. Ryan Jackson, Ruth L. Kirschstein National Research Service Award (NRSA) from the National Institutes of Health (NIH). 2016 Assistant Professor at Utah State University (http://www.chem.usu.edu/people/faculty/ryan-jackson).

Ph.D. Students Advised:
Reece Erickson (Microbiology and Immunology, Anticipated graduation 2024)
Calvin Cicha (Microbiology and Immunology, Anticipated graduation 2023)
Tanner Wiegand (Microbiology and Immunology, Anticipated graduation 2023)
Murat Buyukyoruk (Microbiology and Immunology, Anticipated graduation 2022)
Paul van Erp (2017 winner of the Kopriva Graduate Student Fellowship, and 2015 winner of the Graduate Student Competitive Research Grant, Montana Academy of Science Fellowship; Est. Graduation Date: 2019)
Dr. Shefah Qazi, Co-advised with Trevor Douglas, currently training as a postdoctoral fellow in the Zlotnick lab at Indiana University.

Masters Students Advised:
Enock Kessy (Fulbright scholar, Microbiology and Immunology, Anticipated graduation 2019)
Wayne Lin (Microbiology and Immunology, Graduated 2016)

Rotation Students Advised:
Alix Herr (Microbiology and Immunology, Fall 2012)
Tatsuya Akiyama (Molecular Biosciences Program, Fall 2012)
Laura Brutscher (Molecular Biosciences Program, Fall 2012)
Benjamin White (Molecular Biosciences Program, Spring 2013)
Jacob Munson-McGee (Molecular Biosciences Program, Spring 2013)
Delisha Meishery (Molecular Biosciences Program, Spring 2013)
Joanna Borgogna (Molecular Biosciences Program, Fall 2014)
Alexander McMenamin (Molecular Biosciences Program, Fall 2015)
Brittnay Jinkens (Molecular Biosciences Program, Fall 2015)
Eric Dunham (Microbiology and Immunology, Spring 2016)
Jennifer Dankoff (Microbiology and Immunology, Fall 2016)
Brian Ross (Molecular Biosciences Program, Fall 2016)

Undergraduate Student Research Mentor:
1. Pushya Krishna (Presidential Scholar and VPR undergraduate research scholarship)
2. Laina Hall (Presidential Scholar and VPR undergraduate research scholarship)
3. Cole Martin (paper in press at *Nature Structure and Molecular Biology*)

4. Dominick Faith (The President's Emerging Scholars Award, paper pending review at *Cell*)
5. Myndi Holbrook (INBRE and USP research awards, paper in preparation)
6. Michael Angyus
7. Robert Bruner (Irving Wiseman fellowship)
8. Memett Dursun
9. Matt Gotta
10. Allysa Jones
11. Samantha Goodbug
12. Kim Lantrip (NIH supported INBRE student from Flathead Community College that transferred to MSU after her summer research experience)
13. Kamrin Sorensen (HHMI supported undergraduate scholars program form Gonzaga University)
14. Britteny Forsman (1 publication, Honors College, NIH supported INBRE student, Carol Belohlavek & Nicholas Hether Microbiology Scholarship)
15. Kathryn McNamee (Honors College, HHMI supported undergraduate scholars program)
16. Conner Hoffmann (2 publication, Honors College, recipient of VPR undergraduate research scholarship, Truman Scholarship, http://www.montana.edu/news/17644/two-msu-students-receive-truman-scholarship)
17. Aspen Hirsch (HHMI supported undergraduate scholars program form Gonzaga University)
18. Josh Carter (9 publications, Honors College, HHMI supported undergraduate scholars program, Irving L. Weissman Undergraduate Biomedical Research Scholarship, Goldwater fellowship, finalist for the Truman fellowship, feature in a blog post by Dr. Francis Collins http://directorsblog.nih.gov/2016/03/17/labtv-curious-about-computer-modeling-of-proteins/, http://www.montana.edu/news/16088/national-institutes-of-health-director-features-msu-undergrad-on-blog), winner of the Rhodes (http://www.montana.edu/news/16538/msu-s-josh-carter-wins-rhodes-scholarship) and the Goldwater scholarships (http://www.montana.edu/news/16063/three-msu-students-receive-prestigious-goldwater-scholarships).
19. Kirra Paulus (1 publication, Honors College, Supported by the Undergraduate Scholars program, Outstanding Junior Award)
20. Jillian Stika
21. Michael Rutkowski
22. Janis Nicholes
23. Axl Levan

Technicians and Senior Research Scientists:
MaryClare Rollins (2012 – present) currently has five publications from the Wiedenheft lab
Sarah Golden (2012 – present) currently has five publications from the Wiedenheft lab
Dr. Royce Wilkinson (2013 – present) currently has two publications from the Wiedenheft lab
Dr. Heine Miettinen-Granger (2016– present)

Summer Research Project Mentor for Tribal College Students:

Marcus Vandall (Ft. Peck Community College, 2013)
Floyd Mcmillan (Ft. Peck Community College, 2014)

Committee member for PhD students:
Olga Musharova (Skolkovo Institute of Science and Technology, Moscow, Russia)
Sergey Shmakov (Skolkovo Institute of Science and Technology, Moscow, Russia)
Jennifer Dankoff (Microbiology and Immunology)
Alix Herr (Microbiology and Immunology)
Luuk Loeff (Biophysics, Delft University, Netherlands)
Tim Kunne (Molecular Biology, Wageningen University, Netherlands)
Ethan Edwards (Biochemistry)
Ravi Chaudhary (Biochemistry)
Ece Topuzlu (Biochemistry)
Jonathan Martinson (Microbiology and Immunology)
Pilar Manriquein (Microbiology and Immunology)
Jacob Munson-McGee (Molecular Biosciences Program)
Laura Brutscher (Molecular Biosciences Program)
Benjamin Schwarz (Chemistry)
Greg Prussia (Biochemistry)
Paul Jordan (Chemistry)

Committee member for Masters students:
Dengfeng Li (Microbiology and Immunology)
Stephen Olshefsky (Microbiology and Immunology)

2015 Invited Gordon Research panel member for graduate student mentorship
Discussion panel title "What do I do with my Physical Virology focused PhD?"

TEACHING

Instructor

Course Number	Course	Number of Students	Year
BIOB415/MB525	Biotechnology	12	2013-2017
MBSP613	Scientific Writing	12	2014-2017
BIOB435/BIOB530	Virology	75	2014-2016
MB592	Journal Club (Speaker-Based)	22	2015-2017

Lecturer

Course Number	Course	Number of Students	Year
BIOB478	Functional Gene Expression	15	2013, 2017
BIOM400	Medical Microbiology	30	2013-2014
BIOM455	Molecular Methods	25	2014

BIOM410	Microbial Genetics	35	2014
MB525	Advanced Immunology	22	2014
BCH544	Advanced Molecular Biology	25	2014
BIOB375	Genetics	20	2014
BIOB105	Biotech	40	2012-2017
BIOB375	Genetics	20	2015
BIOB424/BIOB524	Bioethics	40	2013-2018
MB592	Journal club-Speaker-Based	22	2015-2017
BIOB105	Biotech	60	2015
EMEC424	Cellular Mechanotransduction	12	2016-2017
TE250	Technology and Society	50	2016
BCH441	Macromolecules	30	2017
PHL321	Philosophy & Biomedical Ethics	40	2018
HONR494	Human Nature	30	2018
MB525	Advanced Immunology	14	2018

PRODUCTS

Patents: *Holder of two issued US patents, one divisional of a US patent, one continuation-in-part of a US patent and three patents pending issuance in the US and abroad.*

1. Title: *GENE MODULATION WITH CRISPR SYSTEM TYPE I*
   Filed: Nov 1, 2018
   Inventors: **B. Wiedenheft** and Sarah Golden
   Provisional Patent Application No.: 62/7478-100821-01
2. Title: *Bi-directional Targeting for Genome Editing*
   Filed: 6/16/2015
   Inventor: **B. Wiedenheft**
   Provisional Patent Application No.: 62/073,232
3. Title: *Enhanced site-specific homology directed repair using DNA donors*
   Filed: 4/9/2015
   Inventor: **Wiedenheft B**., Smoller D., Wilkinson R., Cui X.
   Provisional Patent Application No.: 62/144,974
4. Title: *Engineered CRISPR RNA-guided complex (Cascade)*
   Filed: 10/31/2014
   Inventor: **Wiedenheft B.**, R. Jackson
   Provisional Patent Application No.: 62/180,585
5. Title: *Endoribonuclease Compositions and Methods of Use Thereof*
   International Filing Date: 09.05.2011
   Inventors: Haurwitz, R.E.; Doudna, J.A.; **Wiedenheft, B.**; Jinek, M.
   Patent number: 9,115,348
   International Application No.: PCT/US2011/035775
   Pub. No.: WO/2011/143124

6. Title: *Methods of Generating Nucleic Acid Fragments*
   Filed: March 2, 2011
   Inventors: **B. Wiedenheft**, K. Zhou; Kaihong, J.A. Doudna
   Serial No.: 039160
   Series Code: 13
   United States Patent Application No.: 20110223638
   Kind Code: A1
   International Application No.: PCT/US2014/024598

Current and Pending Support

Active:

National Science Foundation - Major Research Instrumentation
NSF-MRI 1828765 (PI: Lawrence, Co-PI: **Wiedenheft**) 10/01/2018 – 09/30/2021
Total costs: $2.42 M
Title: A Multi-User Cryo-Electron Microscope for the Cellular and Molecular Life Sciences Community in the Northern Rocky Mountain Region

Department of Energy
DOE-EE0008247 (PIs: Viamajala, Varanasi; Co-PI: **Wiedenheft)** 07/01/2018 – 08/31/19
Total costs: $3.0 M
Annual Direct Costs: $40K 0.2 calendar
Role: Genetically engineer algae to produce high concentration of biofuel.
Title: A comprehensive strategy for stable, high productivity cultivation of microalgae with controllable biomass composition
Goals: The University of Toledo, in partnership with Montana State University and the University of North Carolina, will cultivate microalgae in high-salinity and high-alkalinity media to achieve productivities without needing to add concentrated carbon dioxide.

National Institutes of Health
R21AI130670 (PI: **Wiedenheft**) 9/01/17 – 08/31/19
Total costs: $407,925
Annual Direct Costs: $131K 1.2 calendar
Subaward to Co-PI: Grieshaber, Scott
Subcontract total costs: $21,249
Title: CRISPR generated human genome knockout library for understanding Chlamydial pathogenesis
Goals: This proposal aims to determine human host factors necessary for replication of Chlamydia.

National Institutes of Health
R01GM108888-04 (PI: **Wiedenheft**) 1/01/14 – 12/31/18
Total costs: $1.4 M
Annual Direct Costs: $171K 4.0 calendar

Title: Structure, function and application of CRISPR RNA-guided immunity in bacteria
Goals: This proposal aims to determine the mechanism of target recognition and recruitment kinetics of Cas3 by the RNA-guided surveillance systems in E. coli.

National Institutes of Health
R01GM110270 - 01A1 (**Wiedenheft**) 10/01/16 – 9/30/20
Total costs: $1.08 M
Annual Direct Costs: $171K 3.0 calendar
Subaward to Co-PI: Lander, Gabriel
Subcontract total costs: $348,000
Title: Structure and function of CRISPR RNA-guided surveillance systems in *P. aeruginosa*
Goals: This proposal aims to determine the mechanism of target recognition, recruitment of trans-acting Cas2/3 nuclease and the mechanism of suppression by virally encoded anti-CRISPRs.

United State Dept of Agriculture
USDA: MONB00021Animal Health (PI: Jutila) 9/1/2018-8/30/2020
Total costs: $30,000
Subaward to **Wiedenheft** 0.2 calendar
Total subaward: $5,000
Title: Use of innate immune system adjuvants as countermeasures against salmonellosis in calves
Goal: Study the effects of plant polysaccharides and TLR agonists as novel approaches to increase disease resistance in bovine calves.

Gordon & Betty Moore Foundation (PI: McCutcheon) 12/01/17 – 11/21/19
Total costs: $2 M
Project Leader: **Wiedenheft** ($100,000 directs) 0.2 calendar
Title: How does a bacterium become part of its host cell? The cell biology of symbiosis.
Goals: Develop new methods for editing non-model organism genomes that will allow us to address fundamental questions about evolution.

Sponsored Research Agreement with SurGene LLC (**Wiedenheft**)
Total costs: $440,000
Title: Developing new methods for enhanced surgical repair of DNA.
Goals: Develop new methods for gene editing and the surgical repair of defective genes.

Sponsored Research Agreement with Horizon Discovery Ltd. (**Wiedenheft**)
Total costs: $244,000
Title: A CRISPR alternative to genome engineering.
Goals: Develop alternative CRISPR systems for applications in genome engineering.

M. J. Murdock Charitable Trust
PI: Martin Lawrence

Title: Shared instrumentation for functional and structural studies of proteins.
Awarded: February 2013

Pending:

National Institutes of Health
R21AI130670 (PI: Jutila, Co-PI: **Wiedenheft**) 01/01/2019-12/31/2020
Total costs: $396,000
Annual Direct Costs: $110K 0.5 calendar
Title: Optimized phage therapy for Brucella infection.
Goal: The major goal of this project is to optimize the use of lytic phage to treat Brucella infection. Represents the grant under consideration for funding.

Previous Support:

5 P30 GM110732-03 (Quinn) 9/01/16 – 8/31/17 0.5 calendar
Project Leader: **Wiedenheft, Blake**
Title: CRISPR generated human genome knock-out library for studying chlamydial pathogenesis
Goals: This proposal aims to determine human host factors necessary for replication of Chlamydia.

NIH/NIGMS (P20GM103500) 6/1/12 – 6/30/15
PI: Quinn, Mark T Direct Costs (BW): $150,000/yr
Project Leader: **Wiedenheft, Blake**
Title: Mechanisms of RNA-guided Adaptive Immunity in Bacteria
Goals: Determining the requirements for target recognition and the events that result in selective degradation of these invading nucleic acids by the adaptive immune systems in P. aeruginosa.

Bill and Melinda Gates Foundation Grand Challenges (Phase I) 0 5/01/14 – 10/31/15
PI: Walk, Seth Direct Costs: $33,000/yr
Co-PI: **Wiedenheft, Blake** Direct Costs: $33,000/yr
Co-PI: Spence, Jason Direct Costs: $33,000/yr
(OPP1108199- Grand Challenges Explorations Round 12)
Title: Engineering human intestinal organoids to model dysbiosis during enteric dysfunction
State of Montana Research Initiative - One Medicine 10/1/15– 10/1/16
PI: Voich, Jovanka; Project leader: **Wiedenheft, Blake**
Title: Identifying and Designing New Strategies for Enhanced Genome Engineering