

## CURRICULUM VITAE

**Sandra Hope, BA, MS, PhD, MBA**

3134 LSB Microbiology & Molecular Biology Department  
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### EMPLOYMENT AND POST-DOCTORAL EXPERIENCE

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I am currently in a Professional Faculty position with Continuing Faculty Status (Tenured) as a full Professor at BYU. My duties are divided evenly between functions as the director of the Research Instrumentation Core (RIC) facility and teaching. Citizenship is expected, but research is not an expectation for my position.

- 2016- Professor, Microbiology and Molecular Biology Department  
Brigham Young University
- 2004- Director, Research Instrumentation Core (RIC) Facility, College of Life Sciences  
Brigham Young University
- 2010-2016 Associate Professor, Microbiology and Molecular Biology Department  
Brigham Young University
- 2004-2010 Assistant Professor, Microbiology and Molecular Biology Department  
Brigham Young University
- 2003-2004 Research Associate, Microbiology, Immunology and Molecular Genetics Department  
University of Kentucky Medical School
- 2000-2003 Post-Doctoral Fellow, Microbiology, Immunology and Molecular Genetics Department  
University of Kentucky Medical School

### EDUCATION

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- 2022 MBA, Executive Program, Marriott School of Business  
Brigham Young University  
All coursework for this degree was completed in 2021. Due to COVID, the Foreign Business Excursion was delayed. Students were given an option to delay receiving the degree for another year in order to attend the trip.
- 2000 Ph.D., Veterinary Science; Virology & Immunology, Veterinary Science Department  
University of Kentucky College of Agriculture  
Dissertation: Development of a competitive reverse transcription PCR assay to quantify equine IFN- $\gamma$ , IL-2, IL-4 and G3PDH. Preliminary study of equine arteritis virus (EAV) and cytokine responses in horses.
- 1993 M.S., BioVeterinary Science; Virology & Biochemistry, Animal, Dairy & Vet. Sci. Dept.  
Utah State University  
Thesis: Inhibitors of equine arteritis virus replication.
- 1992 B.A., German with Chemistry minor; Pre-veterinary medicine.  
Utah State University

### PROFESSIONAL AFFILIATIONS

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- 2010-2018 Member, International Society for Transgenic Technology
- 2009-2016 Cohort 2, Science Education Alliance (SEA-PHAGES), Howard Hughes Medical Institute
- 2007-2015 Executive Committee Member, Autumn Immunology Conference, Chicago
- 2003- Member, American Association of Immunologists
- 1997- Member, American Society for Microbiology
- 1993-2006 Associate Member, American Society for Virology

## RIC FACILITY DIRECTOR – Professional Faculty Member

2004-	Management of the Research Instrumentation Core (RIC) <b>Equipment:</b> flow cytometers, platereaders, spectrophotometry, fluorescent microscopy, centrifuges. <b>Duties:</b> Purchase, maintain, oversee services and quality control of equipment. Train and manage technicians to maintain records for equipment usage and billing, prepare biannual audits, propose and implement changes. Train and provide consulting to students and faculty for equipment, protocols and data interpretation.
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## LEADERSHIP & SERVICE

2021-	Member, University Faculty Council on Rank and Status-Professional, BYU
2021	Chair, Strategic Planning Committee, Microbiology & Molecular Biology Dept., BYU
2020-	Associate Chair, Microbiology & Molecular Biology Dept., BYU
2019-	Biosafety Consultant, Local Affiliate Voting Member, Clinical Biosafety Services
2019-	Chair, University Vivarium Advisory Board, BYU
2012-	Faculty Development Committee Member, Microbiology & Molecular Biology Dept., BYU
2018-2019	Member, University Vivarium Advisory Board, BYU
2015	Chair, Autumn Immunology Conference (early withdrawal from this position, served 3 months)
2014	Secretary, Autumn Immunology Conference
2013	Workshop Coordinator, Autumn Immunology Conference
2008-2012	Undergraduate Curriculum Committee Chair, Microbiology & Molecular Biology Dept., BYU
2008-2012	College Curriculum Committee Member, College of Life Sciences, BYU
2007-2015	Executive Committee Member, Autumn Immunology Conference
2007-2012	Undergraduate Program Coordinator, Autumn Immunology Conference
2007-2011	Computer Resources Committee Member, College of Life Sciences, BYU
2005-2017	Specific Pathogen-Free Animal Facility Advisory Committee Member, College of Life Sci., BYU
2004-2017	Core Facility Directors Committee Member, College of Life Sciences, BYU
2004-2007	Resource Committee Member, Microbiology & Molecular Biology Dept., BYU
2005, 2006	Workshop Chair, Innate Immunity, Autumn Immunology Conference, Chicago, IL
2004	SuperVision Certificate, Human Resources Supervisor Training Program, Univ. of Kentucky

## TEACHING EXPERIENCE (student ratings $\bar{x}$ =4.7/5)

2004-	Brigham Young University, Provo, Utah	Credits	Hrs/wk	# semesters	# sections taught
	MMBio194 Phage Hunters (team taught)	2	6	6	6
	Bio241/MMBio241 Molecular & Cell Biol. Lab	1	3	15	68+37evening
	MMBio121 General Biology: Health & Disease	3	3	4	4
	MMBio261 Infection & Immunity	3	3	6	6
	MMBio365 Advanced Lab Techniques	1	3	5	13
	MMBio390R Reading in Molecular Biol.	1	1	1	1
	MMBio361 Infection & Immunity	4	4	6	5
	MMBio463/551R Immunology	3	3	16	14
	MMBio466 Virology Lab (team taught)	1	3	2	2
	MMBio467/551R Immunology Lab	1	3	14	14
	MMBio490R/691R Molecular Biology Seminar	1	1	1	1
	MMBio494R Mentored Research	Var.			50+
	MMBio551R Cytoflex Independent User	1	1	1	1
1995-2000	Lexington Community College (LCC), Biological Sciences Lexington, KY, Extension, Danville KY				
	BSL 100 Human Anatomy & Physiology	3	3	14	14
	BSL 100 lab Human Anatomy & Physiology Lab	1	3	7	11
	Bio 102 Human Ecology (non-sci. maj.)	3	3	1	1
	Bio 103 Introductory Biology (non-sci. maj.)	3	3	1	1
	Bio 195 Human Anatomy & Physiol. & Lab	4	6	1	1

## TEACHING PUBLICATIONS

MMBio261	<i>Our Immune System and the Pathogens that Challenge Us: Foundations in Immunology, Virology, and Bacteriology.</i> (2019) Sandra Hope, Brian Poole, Great River Technol., online textbook, ISBN: 9781644961407 <a href="https://www.greatriverlearning.com/product-details/1666">https://www.greatriverlearning.com/product-details/1666</a>
MMBio151	<i>Relevant Microbiology.</i> (2010) Don Breakwell, Sandra Hope, Rich Robison, Paul Farnsworth. Great River Technol., online lab, ISBN: 9781615491537 <a href="https://www.greatriverlearning.com/product-details/505">https://www.greatriverlearning.com/product-details/505</a>
MMBio466	<i>Laboratory Exercises in Virology.</i> (2007) F. Brent Johnson, Sandra H Burnett
MMBio241	31 Video Tutorials for Molecular and Cellular Biology Lab. (2006) Sandra Burnett
MMBio467	<i>Immunology Lab Manual.</i> (2007) Sandra H Burnett
MMBio241	<i>Molecular and Cellular Biology Lab.</i> (2005) Sandra Burnett

## STUDENT EVALUATIONS OF TEACHING – Most Recent 5 Years

	Semester	Course	Cr Hr	Class Size	My Composite		Univ. Ave.	Historic Course Ave.*	Uncertainty Band for My Course	Uncertainty Band for Dept.	My Course Ave. GPA
					Course Rating	Dept Ave.					
2021	Fall	MMBio463 Immunology	3	45	4.9	4.5	4.5	4.7	4.8 - 5.0	4.5 - 4.7	3.48
	Fall	MMBio551R Cytoflex Independent User	1	3	4.8	4.6	4.6	4.6	5.0 - 5.0	4.4 - 4.8	4.00
	Spring	MMBio261 Infection & Immunity	3	34	4.7	4.5	4.5	4.6	4.5 - 5.0	4.3 - 4.7	3.82
	Winter	MMBio121 Biology Health & Disease (GE)	3	112	4.7	4.4	4.4	4.4	4.5 - 4.9	4.3 - 4.5	3.39
2020	Fall	MMBio463 Immunology	3	45	4.9	4.5	4.5	4.7	4.8 - 5.0	4.4 - 4.6	3.68
	Spring	MMBio261 Infection & Immunity	3	41	4.8	4.6	4.6	4.6	4.6 - 5.0	4.4 - 4.8	3.74
	Winter**	MMBio121 Biology Health & Disease (GE)	3	116	4.8	4.5	4.5	4.4	4.7 - 4.9	4.4 - 4.6	3.65
2019	Fall	MMBio463 Immunology	3	62	4.5	4.5	4.5	4.7	4.3 - 4.7	4.4 - 4.6	3.48
	Fall	MMBio467 Immunology Lab	1	13	4.8	4.5	4.5	4.8	4.6 - 5.0	4.4 - 4.6	3.93
	Spring	MMBio261 Infection & Immunity	3	23	4.8	4.5	4.5	4.7	4.6 - 5.0	4.4 - 4.6	3.69
	Winter	MMBio121 Biology Health & Disease (GE)	3	132	4.4	4.4	4.4	4.3	4.2 - 4.6	4.3 - 4.5	3.42
2018	Fall	MMBio463 Immunology	3	42	4.8	4.4	4.4	4.7	4.6 - 5.0	4.3 - 4.5	3.47
	Fall	MMBio467 Immunology Lab	1	9	4.9	4.5	4.5	4.8	4.6 - 5.0	4.3 - 4.5	3.43
	Spring	MMBio261 Infection & Immunity	3	19	4.6	4.3	4.3	4.7	4.2 - 5.0	4.1 - 4.5	3.77
	Winter	MMBio121 Biology Health & Disease (GE)	3	95	4.5	4.5	4.5	4.3	4.3 - 4.7	4.4 - 4.6	3.16
2017	Fall	MMBio463 Immunology	3	47	4.8	4.4	4.4	4.7	4.7 - 5.0	4.3 - 4.5	3.48
	Fall	MMBio467 Immunology Lab	1	11	4.9	4.4	4.4	4.7	4.7 - 5.0	4.3 - 4.5	3.65
	Spring	MMBio261 Infection & Immunity	3	17	4.9	4.4	4.4	4.7	4.7 - 5.0	4.2 - 4.6	3.60
	Winter	MMBio121 Biology Health & Disease (GE)	3	101	4.2	4.3	4.3	4.3	4.0 - 4.4	4.2 - 4.4	3.32
	Winter	MMBio467 Immunology Lab	1	21	4.8	4.3	4.3	4.6	4.5 - 5.0	4.2 - 4.4	3.77

\* The Historic Course Ave. includes my scores from the same course in previous years averaged with that of the same course taught by others. Ratings are based on a scale from 0.0-5.0.

\*\* COVID Pandemic began.

	Darker shading indicates a statistically higher score for my Composite Course Rating and that of the dept, based on Uncertainty Bands.
	Lighter shading indicates that the upper end of the dept. scores is the same as the lower end of my scores, based on Uncertainty Bands.
	Unshaded indicates that my Composite Course Rating fell within that of the department average, based on Uncertainty Bands.

No courses fell below that of the department average, based on Uncertainty Bands.

	Question on evaluation	Representative comments from Student Evaluations
Instructor Effectiveness	Explained concepts effectively	She simplifies the insanely complex parts of the immune system. When things are really tricky, I also appreciated that she would encourage us to talk it over with our group and then also ask the TAs for help. She explains concepts well, but also encourages us to teach each other. I feel like she gave us good skills on how to work things out on our own.
	Well organized	The course organization was clear and built on itself.
	Opportunities to get help	Dr. Hope would always take questions as students had them. She also would refer to TA's and made sure they were available to help students as they needed it.
	Opportunities for student involvement	We did super fun group presentations in the class. I've never had so much fun presenting and listening to group presentations.
	Responded to students respectfully	She is loving, compassionate, and understanding of her students. Her lectures always felt like a good safe place. She loved questions, and she wanted to hear what we thought about things.
Helped students achieve the Aims of a BYU Education	Spiritually strengthening	I absolutely love when my teachers share spiritual insights and testimony that they have gained through the study of our field, and Dr. Hope does a great job at that. You can tell that she has a testimony of the gospel and that her scientific knowledge contributes to her spiritual knowledge
	Intellectually enlarging	This class has a TON of material, but she makes it doable to learn it all. I learned so much in this class. I learned SO much in Dr. Hope's class. She does such a great job at connecting everything that we learned to things that are relevant to everyone's lives. She gave lots of examples and made lots of connections to our everyday lives.
	Character building	She is an amazing person and made me want to be one too.
	Leading to lifelong learning and service	She inspires me to be better in my schoolwork, my interactions with others, and my peers.
	Additional Comments	Dr. Hope is a phenomenal professor. Not an easy class, but very enjoyable. Dr. Hope is one of the kindest, most loving, spiritually-uplifting science professors I have had at BYU. I am so happy that she is a part of our campus!

## PROFESSIONAL DEVELOPMENT ACTIVITIES

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Jul 2019-	Executive MBA program, Marriot School of Business, Brigham Young University
Jun 2014	SEA-PHAGES Advanced Phage Genomics Workshop, Howard Hughes Medical Institute
'12, '13	Writing Matters Workshops, BYU University Writing
'11, '12	Learning Suite Workshops, BYU Center for Teaching and Learning
Jun, Dec '09	SEA-PHAGES In-situ and In-silico training sessions, Howard Hughes Medical Institute
'06, '07, '13	Participant, Publish and Flourish Writing Group, BYU Faculty Center
May 2006	BYU Writing Matters Faculty Workshop
Oct. 2005	Certified Operator, BD Biosciences FacsCanto Fluorescence Activated Cell Analyzer
Feb. 2005	Certified Operator, BD Biosciences digital FacsVantage SE Fluorescence Activated Cell Sorter
Jan. 2005	Certified Operator, MIDI, Inc. Gas Chromatography identification of bacterial cultures
2004-2005	BYU Faculty Development Seminar Series
Nov. 2004	Reinvention Center Meeting, Integrating Research into Undergraduate Education
Oct. 2004	Certified Operator, BD Biosciences analog FacsVantage SE Fluorescence Activated Cell Sorter
Feb. 2004	Univ. of Kentucky SuperVision, Human Resources Supervisor Training Program

## SCHOLARSHIPS, HONORS & AWARDS

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2016	Outstanding Achievement in Technology Transfer, Brigham Young University
2014	Outstanding Teaching Award, College of Life Sciences, Brigham Young University
2012	Most Publication in ISI-listed Journals, Department of Microbiol. & Mol. Biol., BYU
2012	Highest Student Ratings in a 300-level Course, Department of Microbiol. & Mol. Biol., BYU
2010	Wiki Spirit Award, Science Education Alliance, Howard Hughes Medical Institute
2010	Phage Spirit Award, Science Education Alliance, Howard Hughes Medical Institute
2002-2003	NIH Research Training Grant in Microbial Pathogenesis, Univ. of Kentucky Medical School
2001-2002	NIH Research Training Grant in Microbial Pathogenesis, Univ. of Kentucky Medical School
2000-2001	NIH Research Training Grant in Cancer Etiology and Treatment, Univ. of KY Medical School

## INTELLECTUAL PROPERTIES (note that my former name was Sandra H. Burnett)

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U.S. Patent	“Methods and Devices for Charged Molecule Manipulation,” Aten, Q.T., Burnett, S.H., Howell, L.L., Jensen, B.D., assigned to Brigham Young University.
Example Provisional Patents Pending or Invention Disclosures Filed (8 of ~18)	“Inactivation of Bacterial Spores Using Phages That Bind” Hope, S., assigned to Brigham Young University. “System and Method for Treating a Disease or Bacterial Infection – Bystander Phage Therapy” Hope, S., assigned to Brigham Young University. “System and Method for Treating a Disease or Bacterial Infection” Hope, S., assigned to Brigham Young University. “Blood dopamine D2 receptors as biomarkers for brain dopamine” Hope, S., Burton GF, Steffensen SC, Assigned to Brigham Young University. “Cytoplasm-to-Organelle Macromolecule Transport via Nanolance-Generated Localized Intracellular Electric Field,” Quentin T. Aten, Regis A. David, Sandra H. Burnett, Brian D. Jensen and Larry L. Howell, assigned to Brigham Young University. “Pronuclear DNA Transfer via Nano-Featured Lance and Metamorphic Microelectromechanical System,” Quentin T. Aten, Sandra H. Burnett, Brian D. Jensen and Larry L. Howell, assigned to Brigham Young University. “Cell corrals designed to store cells during the cell manipulation processes,” Easter, M., Fazio, W., Aten, Q. Jensen, B., Howell, L., Burnett, S., assigned to Brigham Young University.
Transgenic Mouse Development	Transgenic mouse strain developed and donated to Jackson Laboratories: Macrophage Fas-Induced Apoptosis (Mafia) mice. Jackson stock number 005070. Strain: C57BL/6J-Tg(Csf1r-EGFP-NGFR/FKBP1A/TNFRSF6)2Bck/J

**RESEARCH SUPPORT** (total of \$816,118)

2016-2017	\$ 10,000	PI. Phage binding to <i>Paenibacillus larvae</i> spores, North American Pollinator Protection Campaign (NAPPC) Honey Bee Health Improvement Project Grant.
2014-2016	\$200,000	Co-PI with J. Grose, D. Breakwell. Funding to perpetuate the “Phage Hunters” research program, private donation.
2012-2013	\$ 16,000	Co-PI with J. Grose, D. Breakwell. A phage-based treatment for Fireblight and American Foulbrood. BYU Technology Transfer.
2012	\$ 1,500	PI. Transgenic mouse rederivation project. NIH-University of Utah.
2011-2012	\$ 49,950	Co-PI with L.Howell, B.Jensen (PI). Cytoplasm-to-Pronucleus and YAC
2011	\$132,668	NanoInjection. NanoInjection and Cell Restraint Technologies. NanoInjection
2010-2011	\$ 97,500	Technologies, LLC.
2010	\$116,214	} Co-PI with L.Howell, B.Jensen (PI). Development of NanoInjection Prototypes and Protocols, Phases I, II, and III. NanoInjection Technologies, LLC.
2009-2010	\$127,386	
2009-2012		Co-PI with D. Breakwell to join Science Education Alliance, National Research Genomics Initiative to setup and run “Phage Hunters” research program, Howard Hughes Medical Institute.
2008-2009	\$15,000	Office of Research and Creative Activity Mentoring Grant, Brigham Young Univ.
2006-2007	\$30,000	Office of Research and Creative Activity Mentoring Grant, Brigham Young Univ.
2005-2006	\$19,900	College of Biology and Agriculture Mentoring Grant, Brigham Young Univ.

**JOURNAL PUBLICATIONS** (60 academic publications, all but 16 have undergraduate student authors)

1. Rollins J, Worthington T, Hooke E, Hobson J, Wengler J, **Hope S**, Mizrahi D (2021) Expression of cell-adhesion molecules in *E. coli*: a high-throughput method to identify paracellular modulators. *bioRxiv* doi: 10.1101/2021.04.08.439041.
2. Scott Brady TS, Roll CR, Walker JK, Fajardo CP, Breakwell DP, Eggett DL, **Hope S** (2021) Phages Bind to Vegetative and Spore Forms of *Paenibacillus larvae* and to Vegetative *Brevibacillus laterosporus*. *Frontiers in Microbiology*. Jan 26(12):588035. doi: 10.3389/fmicb.2021.588035
3. Brown T, **Hope S**, Jensen B (2019) Fabrication and testing of a MEMS system for injection of DNA into plant cells. *Proceedings of ASME 2019 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*. IDETC2019-98019, 1-10.
4. Berg J, Merrill B, Breakwell D, **Hope S**, Grose J (2018) A PCR-based method for distinguishing between two common beehive bacteria, *Paenibacillus larvae* and *Brevibacillus laterosporus*. *Applied and Environmental Microbiology*. 84(22): e01886-18. doi: 10.1128/AEM.01886-18
5. Brady TS, Merrill BD, Hilton JA, Graves KA, Fajardo CP, **Hope S** (2018) Bystander Phage Therapy: Inducing Host-associated Bacteria to Produce Antimicrobial Toxins Against the Pathogen using Phages. *Antibiotics*. 7(4) 105. <https://doi.org/10.3390/antibiotics7040105>.
6. Merrill BD, Fajardo CP, Hilton JA, Payne AM, Ward AT, Walker AK, Dhalai A, Imahara C, Mangohig J, Monk J, Pascacio C, Rai P, Salisbury A, Velez K, Bloomfield TJ, Buhler B, Duncan SG, Furiman DA, George J, Graves K, Heaton K, Hill HL, Kim K, Knabe BK, Ririe DB, Rogers SL, Stamereilers C, Stevenson MB, Ward CS, Wright CK, Withers JM, Usher BK, Breakwell DP, Grose JH, **Hope S**, Tsourkas PK(2018) Complete genome sequences of eighteen *Paenibacillus larvae* phages from the Western United States. *Microbiology Resource Announcements*. 7 (13): e00966-18. doi: 10.1128/MRA.00966-18
7. Sharma R, Berg J, Choi M, Cowger A, Cozzens B, Duncan S, Fajardo C, Ferguson H, Galbraith T, Herring J, Hoj T, Durrant J, Hyde J, Jensen G, Ke SY, Killpack S, Kruger J, Lawrence E, Nwosu I, Tam T, Thompson D, Tueller J, Ward M, Webb C, Wood M, Wynne H, Yeates E, Baltrus D, Breakwell D, **Hope S**, Julianne Grose. (2018) Genome Sequences of Nine *Erwinia amylovora* Bacteriophages" *Microbiology Resource Announcements*. 7(14): e00944-18. doi: 10.1128/MRA.00944-18.

8. Stamereilers C, Fajardo C, Walker J, Mendez K, Castro-Nallar E, Grose J, **Hope S**, Tsourkas P (2018) Genomic analysis of 48 Paenibacillus larvae bacteriophages. *Viruses*. 10(7) 337. <https://doi.org/10.3390/v10070377>
9. Mitchell UH, Obray DJ, Hunsaker E, Garcia B, Clarke T, **Hope S** and Steffensen SC (2018) Peripheral Dopamine In Restless Legs Syndrome. *Frontiers in Neurology-Movement Disorders*. Mar. 15 <https://doi.org/10.3389/fneur.2018.00155>.
10. Walker J, Merrill B, Berg J, Dhalai A, Dingman D, Fajardo C, Graves K, Hill H, Hilton J, Imahara C, Knabe B, Mangohig J, Monk J, Mun H, Payne A, Salisbury A, Stamereilers C, Velez C, Ward A, Breakwell D, Grose J, **Hope S**, and Tsourkas P (2018) Complete genome sequences of Paenibacillus larvae phages BN12, Dragolir, Kiel007, Leyra, Likha, Pagassa, PBL1c, and Tadhana. *GenomeA*. Jun; 6: doi:10.1128/genomeA.01602-17.
11. Esplin I, Berg J, Sharma R, Jensen G, Bairett S, Ingersoll K, Kruger J, Peck M, Grossarth S, Wienclaw T, Harbaugh K, Ashcroft C, Taylor A, Smith H, Ransom E, Jarvis T, Jaen-Anievas D, Allen R, Bloomfield T, Bybee R, Duncan S, Fuhriman D, Knabe B, Pollock S, Ririe D, Rogers S, Stephenson M, Thompson S, Usher B, Wells M, Wright C, Hyde J, Choi M, Beatty N, Webb C, Hurst E, James B, Tatlow PJ, Payne A, Hilton J, Fajardo C, Merrill B, Ward A, Schoenhals J, Ward M, Jacobson C, Breakwell D, **Hope S**, Grose J (2017) Genome Sequences of 17 Novel Erwinia amylovora Bacteriophage. *GenomeA*. Nov.; 5:doi:10.1128/genomeA.00931-17.
12. Hanauera DI, Grahamb MJ, **SEA-PHAGES**, Betancur L, Bobrownickib A, Cresawn SG, Garlenae RA, Jacobs-Sera D, Kaufmanne N, Pope WH, Russell DA, Jacobs Jr. WR, Sivanathang V, Asaig DJ, and Hatfull GF (2017) An inclusive Research Education Community (iREC): Impact of the SEA-PHAGES program on research outcomes and student learning. *PNAS*, <https://doi.org/10.1073/pnas.1718188115>
13. Brady TS, Merrill BD, Hilton JA, Payne AM, Stephenson MB, **Hope S** (2017) Bacteriophages as an alternative to conventional antibiotic use for the prevention or treatment of Paenibacillus larvae in honeybee hives. *J. Invertebrate Pathology* 150:94-100.
14. Sessions JW, Armstrong DG, **Hope S**, Jensen BD (2017) A review of genetic engineering biotechnologies for enhanced chronic wound healing. *Exp. Dermatol.* (26) 179-185.
15. Esplin I, Berg J, Sharma R, Allen R, Arens D, Ashcroft C, Bairett S, Beatty N, Bickmore N, Bloomfield T, Brady TS, Bybee R, Carter J, Choi M, Duncan S, Fajardo C, Foy B, Fuhriman D, Gibby P, Grossarth S, Harbaugh K, Harris N, Hilton J, Hurst E, Hyde J, Ingersoll K, Jacobson C, James B, Jarvis T, Jaen-Anievas D, Jensen G, Knabe B, Kruger J, Merrill B, Pape J, Payne A, Payne D, Peck M, Pollock S, Putnam M, Ransom E, Ririe D, Robinson D, Rogers S, Russell K, Schoenhals J, Shurtleff C, Simister A, Smith H, Stephenson M, Staley L, Stettler J, Stratton M, Tateoka O, Tatlow PJ, Taylor A, Thompson S, Townsend M, Thurgood T, Usher B, Whitley K, Ward A, Ward M, Webb C, Wienclaw T, Williamson T, Wells M, Wright C, Breakwell D, **Hope S**, and Grose J (2017) Genome Sequences of 19 Novel Erwinia amylovora Bacteriophages. *Genome Announce*. 5 (46): e00931-17. doi: 10.1128/genomeA.00931-17.
16. Grose J, Kropinski AM, Adriaenssens EM, Kuhn JH, **Hope S** (2016). ICTV Taxonomic Proposal 2016.002a-dB.A.v1.Abouovirus. Create genus Abouovirus in the family Myoviridae, order Caudovirales. <http://www.ictv.global/proposals-16/2016.002a-dB.A.v1.Abouovirus.pdf>
17. Grose J, Kropinski AM, Adriaenssens EM, Kuhn JH, **Hope S** (2016). ICTV Taxonomic Proposal 2016.019a-dB.A.v1.Jimmervirus. Create genus Jimmervirus in the family Myoviridae, order Caudovirales. <http://www.ictv.global/proposals-16/2016.019a-dB.A.v1.Jimmervirus.pdf>
18. Grose J, Kropinski AM, Adriaenssens EM, Kuhn JH, **Hope S** (2016). ICTV Taxonomic Proposal 2016.018a-dB.A.v1.Jenstvirus. Create genus Jenstvirus in the family Siphoviridae, order Caudovirales. <http://www.ictv.global/proposals-16/2016.018a-dB.A.v1.Jenstvirus.pdf>

19. Sessions JW, Skousen CS, Price KD, Hanks BW, **Hope S**, Alder JK, Jensen BD (2016) CRISPR-Cas9 directed knock-out of a constitutively expressed gene using lance array nanoinjection. *SpringerPlus* 5:1521,1-11
20. Merrill BD, Ward AT, Grose JH, **Hope S** (2016) Software-based analysis of bacteriophage genomes, physical ends, and packaging strategies. *BMC Genomics* 17:679,1-16.
21. Berg JA, Merrill BD, Crockett JT, Esplin KP, Evans MR, Heaton KE, Hilton JA, Hyde JR, McBride MS, Schouten JT, Simister AR, Thurgood TL, Ward AT, Breakwell DP, **Hope S**, Grose JH (2016) Characterization of five novel Brevibacillus bacteriophages and genomic comparison of Brevibacillus phages. *PLOS One* 11(6);e016838,1-24.
22. Sessions J, Lewis T, Skousen C, **Hope S**, Jensen B (2016) The effect of injection speed and serial injection on propidium iodide entry into cultured HeLa and primary neonatal fibroblast cells using lance array nanoinjection. *SpringerPlus* 5:1093,1-18.
23. Sessions JW, Lindstrom DL, Hanks BW, **Burnett SH**, Jensen BD (2016) The Effect of Lance Geometry and Carbon Coating of Silicon Lances on Propidium Iodide Uptake in Lance Array Nanoinjection of HeLa 229 Cells. *J. Micromechanics and Microengineering* 26(4):1-10.
24. Grose JH, Merrill BD, Berg, JA, Graves KA, Ward AT, Hilton JA, Wake BN, Breakwell DP, **Burnett SH** (2015) Genome Sequences of Five Additional Brevibacillus laterosporus Bacteriophages. *Genome Announc.* Sep-Oct; 3(5): e01146-15.
25. Lewis TE, **Burnett SH**, Jensen BD (2015) Injection Force Effects on Propidium Iodide Uptake in Nanoinjected HeLa Cells. *Proc. ASME Internat. Design Engineering Technical Conferences.* Aug. DETC2015-47630.
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## **INVITED PRESENTATIONS** (18 guest speaker presentations)

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1. *Math in Microbiology*. (2019) Keynote speaker, Nebo School District Junior High and Middle School Math Tournament, Diamond Fork, UT.
2. *The Next Generation in Disease Control*. (2019) Interview by Gerry Hayes and written presentation for *Beeculture* magazine. Phoenix, AZ.
3. *Phage Treatment for American Foulbrood* (2019) Wasatch Beekeepers' Association, Salt Lake City, UT
4. *American Foul Brood; a cure on the horizon, no more bonfires*. (2018) Keynote speaker, Wyoming Bee College Conference, Cheyenne, WY.
5. *Bee Safe Phage Therapy for the Control of American Foulbrood (Paenibacillus larvae) in Honeybees* (2017) United States Food and Drug Administration, Washington, D.C.
6. *Phage Treatment for American Foulbrood* (2017) Utah Beekeepers' Association Convention, Lehi, UT
7. *Phage Treatment for American Foulbrood* (2016) Wyoming Beekeepers Association, Casper, WY.
8. *Finding Phages to Fight American Foulbrood*. (2016) Virus Structure and Assembly Conference, Federation of American Societies for Experimental Biology, Steamboat, CO.
9. *Microfabricated Lance Array Nanoinjection system delivers CRISPR-Cas9 to hundreds of thousands of cells simultaneously*. (2016) International Transgenic Technologies Society 13<sup>th</sup> Conference, Prague, Czech Republic.
10. *Research on the use of Phages to Prevent and Treat American Foulbrood*. (2016) American Honey Producers Association Annual Convention. Albuquerque, NM.
11. *A Pollinators Buzz, The state of the Bee Hive State*. (2015) Horticulture Inspection Society, Western Chapter Conference, Salt Lake City, UT.
12. *BYU Phage Therapy for American and European Foulbrood Update*. (2015) Annual Utah Bee Inspector Meeting, Utah Department of Agriculture and Food, Salt Lake City, UT.
13. *Finding Phages to Treat American Foulbrood*. (2015) American Honey Producers Association Annual Convention. Manhattan Beach, CA.
14. *Studies from the Beehive: Phages, Phamerator, and Phashionable Genes*. (2014) School of Life Science, Seminar Series speaker, University of Nevada, Las Vegas, NV.
15. *BYU Phage Therapy for American and European Foulbrood Update*. (2014) Annual Utah Bee Inspector Meeting, Utah Department of Agriculture and Food, Salt Lake City, UT.
16. *The buzz about Paenibacillus larvae phages*. (2014) 6<sup>th</sup> Annual SEA-Phages Symposium, Symposium speaker, Ashburn, VA.
17. *Phage Therapy for American Foulbrood in Honeybees*. (2013) Annual Utah Bee Inspector Training Meeting, Utah Department of Agriculture and Food, Salt Lake City, UT.
18. *Regulation of hematopoiesis by macrophages in a transgenic mouse model*. (2007) Biology Department Seminar Series speaker, Utah Valley State College, Orem, UT.
19. *iLecture: Make your Own PodCast Lecture for Class*. (2008) Conference workshop, American Society for Microbiology Conference for Undergraduate Educators, Beverly, MA

**GENBANK PUBLICATIONS** (82 full genome sequences published, all but 1 have undergraduate student authors)

The following are GenBank publications of complete phage genomes. All genomes include full genomes (not genome fragments) with complete annotation of all genes and identification of any present tRNAs. Genomes were peer reviewed by GenBank prior to acceptance and publication.

Year	Phage	Accession #	Authors
1 2018	SunLIRen ( <i>E. amylovora</i> phage)	MH426725	Sharma,R., Ke,K., Breakwell,D.P., Hope,S. and Grose,J.H.
2 2018	Pavtok ( <i>E. amylovora</i> phage)	MH426726	Sharma,R., Hughes,J., Breakwell,D.P., Hope,S. and Grose,J.H.
3 2018	DevRi ( <i>P. larvae</i> phage)	MH431933	Ririe,D.B., Buhler,B., Salisbury,A., Pascacio,C., Stamereilers,C., Ward,A.T., Fajardo,C.P., Breakwell,D.P., Grose,J.H., Hope,S. and Tsourkas,P.K.
4 2018	Arcticfreeze ( <i>P. larvae</i> phage)	MH431932	Wright,C.K., Walker,J.K., Withers,J.M., Monk,J.R., Ward,A.T., Fajardo,C.P., Breakwell,D.P., Grose,J.H., Hope,S. and Tsourkas,P.K.
5 2018	Wellington ( <i>E. amylovora</i> phage)	MH426724	Sharma,R., James,B., Berg,J.A., Breakwell,D.P., Hope,S. and Grose,J.H.
6 2018	Gryphonian ( <i>P. larvae</i> phage)	MH431934	Usher,B.K., George,J., Ward,A.T., Fajardo,C.P., Breakwell,D.P., Grose,J.H., Hope,S. and Tsourkas,P.K.
7 2018	Toothless ( <i>P. larvae</i> phage)	MH454084	Heaton,K.E., Velez,K., Merrill,B.D., Ward,A.T., Breakwell,D.P., Grose,J.H., Hope,S. and Tsourkas,P.K.
8 2018	Saudage ( <i>P. larvae</i> phage)	MH454083	Duncan,S.G., Pascacio,C., Ward,A.T., Fajardo,C.P., Breakwell,D.P., Grose,J.H., Hope,S. and Tsourkas,P.K.
9 2018	Genki ( <i>P. larvae</i> phage)	MH454082	Stevenson,M.B., Imahara,C., Ward,A.T., Fajardo,C.P., Breakwell,D.P., Grose,J.H., Hope,S. and Tsourkas,P.K.
10 2018	LincolnB ( <i>P. larvae</i> phage)	MH454081	Merrill,B.D., Payne,A.M., Hilton,J.A., Ward,A.T., Fajardo,C.P., Dhalai,A., Mangohig,J., Hope,S. and Tsourkas,P.K.
11 2018	Jacopo ( <i>P. larvae</i> phage)	MH454079	Ward,C.S., Monk,J.R., Kim,M., Walker,J.K., Fajardo,C.P., Breakwell,D.P., Grose,J.H., Hope,S. and Tsourkas,P.K.
12 2018	Eltigre ( <i>P. larvae</i> phage)	MH454078	Merrill,B.D., Payne,A.M., Hilton,J.A., Ward,A.T., Fajardo,C.P., Rai,P., Hope,S. and Tsourkas,P.K.
13 2018	Bloom ( <i>P. larvae</i> phage)	MH454077	Bloomfield,T.J., Dhalai,A., Ward,A.T., Fajardo,C.P., Breakwell,D.P., Grose,J.H., Hope,S. and Tsourkas,P.K.
14 2018	Lucielle ( <i>P. larvae</i> phage)	MH431937	Rogers,S.L., Monk,J.R., Ward,A.T., Fajardo,C.P., Breakwell,D.P., Grose,J.H., Hope,S. and Tsourkas,P.K.
15 2018	Kawika ( <i>P. larvae</i> phage)	MH431936	Furiman,D.A., Rai,P., Ward,A.T., Fajardo,C.P., Breakwell,D.P., Grose,J.H., Hope,S. and Tsourkas,P.K.
16 2018	Honeybear ( <i>P. larvae</i> phage)	MH431935	Hilton,J.A., Merrill,B.D., Payne,A.M., Ward,A.T., Fajardo,C.P., Dhalai,A., Hope,S. and Tsourkas,P.K.
17 2018	Yerffej ( <i>P. larvae</i> phage)	MH431931	Merrill,B.D., Payne,A.M., Hilton,J.A., Ward,A.T., Fajardo,C.P., Imahara,C., Hope,S. and Tsourkas,P.K.
18 2018	Wanderer ( <i>P. larvae</i> phage)	MH431930	Merrill,B.D., Payne,A.M., Hilton,J.A., Ward,A.T., Fajardo,C.P., Velez,K., Hope,S. and Tsourkas,P.K.
19 2018	Likha ( <i>P. larvae</i> phage)	MG727702	Hill,H.L., Walker,J.K., Mun,H., Merrill,B.D., Ward,A.T., Berg,J.A., Hilton,J.A., Fajardo,C.P., Breakwell,D.P., Grose,J.H., Hope,S. and Tsourkas,P.K.
20 2018	Leyra ( <i>P. larvae</i> phage)	MG727701	Knabe,B.K., Walker,J.K., George,J., Merrill,B.D., Ward,A.T., Berg,J.A., Hilton,J.A., Fajardo,C.P., Breakwell,D.P., Grose,J.H., Hope,S. and Tsourkas,P.K.
21 2018	Tadhana ( <i>P. larvae</i> phage)	MG727700	Payne,A.M., Merrill,B.D., Graves,K., Velez,K., Ward,A.T., Berg,J.A., Hilton,J.A., Fajardo,C.P., Walker,J.K., Breakwell,D.P., Grose,J.H., Hope,S. and Tsourkas,P.K.
22 2018	Pagassa ( <i>P. larvae</i> phage)	MG727699	Merrill,B.D., Graves,K., Salisbury,A., Ward,A.T., Berg,J.A., Hilton,J.A., Fajardo,C.P., Walker,J.K., Breakwell,D.P., Grose,J.H., Hope,S. and Tsourkas,P.K.
23 2018	Kiel007 ( <i>P. larvae</i> phage)	MG727696	Graves,K., Dhalai,A., Stamereilers,C., Merrill,B.D., Ward,A.T., Berg,J.A., Hilton,J.A., Fajardo,C.P., Walker,J.K., Breakwell,D.P., Grose,J.H., Hope,S. and Tsourkas,P.K.
24 2018	BN12 ( <i>P. larvae</i> phage)	MG727695	Payne,A.M., Imahara,C., Merrill,B.D., Ward,A.T., Berg,J.A., Hilton,J.A., Fajardo,C.P., Walker,J.K., Breakwell,D.P., Grose,J.H., Hope,S. and Tsourkas,P.K.
25 2018	PBL1c ( <i>P. larvae</i> phage)	MG727698	Dingman,D., Mangohig,J., Merrill,B.D., Ward,A.T., Berg,J.A., Hilton,J.A., Fajardo,C.P., Walker,J.K., Bakhiet,N., Field,C., Stahly,D.P., Breakwell,D.P., Grose,J.H., Hope,S. and

26	2018	<b>Dragolir</b> (P. larvae phage)	MG727697	Tsourkas,P.K. Merrill,B.D., Monk,J., Ward,A.T., Berg,J.A., Hilton,J.A., Fajardo,C.P., Walker,J.K., Breakwell,D.P., Grose,J.H., Hope,S. and Tsourkas,P.K.
27	2018	<b>Ley</b> (P. larvae phage)	MH454080	Merrill,B.D., Payne,A.M., Hilton,J.A., Ward,A.T., Fajardo,C.P., Salisbury,A., Hope,S. and Tsourkas,P.K.
28	2018	<b>Ash</b> (P. larvae phage)	MH454076	Payne,A.M., Merrill,B.D., Hilton,J.A., Ward,A.T., Fajardo,C.P., Dhalai,A., Stamereilers,C., Hope,S. and Tsourkas,P.K.
29	2018	<b>C7Cdelta</b> (P. larvae phage)	MH431938	Merrill,B.D., Payne,A.M., Hilton,J.A., Ward,A.T., Fajardo,C.P., Mangohig,J., Hope,S. and Tsourkas,P.K.
30	2018	<b>Alexandra</b> (E. amylovora phage)	MH248138	Cowger,A.E., Thompson,D.W., Sharma,R., Herring,J.A., Hoj,T.R., Killpack,S., Lawrence,E., Nwosu,I., Roark,B.J., Tueller,J.A., Choi,M.C., Ferguson,H.P., Kruger,J.L., Hope,S., Breakwell,D.P. and Grose,J.H.
31	2018	<b>Yoloswag</b> (E. amylovora phage)	KY448244	Pollock,S.V., Berg,J.A., Esplin,I.N.D., Hurst,E., Kruger,J.L., Sharma,R., Grose,J.H., Breakwell,D.P. and Hope,S.
32	2018	<b>Asesino</b> (Erwinia phage)	KX397364	Berg JA, Hyde JR, Breakwell DP, Hope S, Grose JH.
33	2017	<b>RisingSun</b> (E. amylovora phage)	MF459646	Putnam,M.J., Sharma,R., Kruger,J.L., Berg,J.A., Payne,A.M., Fajardo,C.P., Breakwell,D.P., Hope,S. and Grose,J.H.
34	2017	<b>Joad</b> (E. amylovora phage)	MF459647	Bickmore,M.X., Vaden,K., Brady,T.S., Arens,D.K., Tateoka,O.B., Carter,J.L., Pape,J.A., Robinson,D.M., Russell,K.A., Staley,L.A., Stettler,J.M., Townsend,M.H., Wienclaw,T., Williamson,T.L., Kruger,J.L., Berg,J.A., Sharma,R., Payne,A.M., Fajardo,C.P., Breakwell,D.P., Hope,S. and Grose,J.H.
35	2017	<b>Mortimer</b> (E. amylovora phage)	MG655270	Sharma,R., Ferguson,H.P., Berg,J.A., Jensen,G.L., Keele,B.R., Ward,M.E.H., Breakwell,D.P., Hope,S. and Grose,J.H.
36	2017	<b>Special G</b> (E. amylovora phage)	KU886222	Sharma,R., Grossarth,S.E., Foy,B., Harbaugh,K., Ingersoll,K., Berg,J.A., Jarvis,T.M., Esplin,I.N.D., Merrill,B.D., Schoenhals,J., Breakwell,D.P., Hope,S. and Grose,J.H.
37	2017	<b>Ray</b> (E. amylovora phage)	KU886224	Sharma,R., Esplin,I.N.D., Berg,J.A., Jensen,G.L., Keele,B.R., Ward,M.E.H., Breakwell,D.P., Hope,S. and Grose,J.H.
38	2017	<b>Simmy50</b> (E. amylovora phage)	KU886223	Sharma,R., Simister,A.R., Berg,J.A., Jensen,G.L., Keele,B.R., Ward,M.E.H., Breakwell,D.P., Hope,S. and Grose,J.H.
39	2017	<b>Smairt</b> (Mycobacteriophage)	MF668283	Tso,M.S., Paredes,A., Zierold,M.E., Delesalle,V.A., Grose,J., Hope,S., Breakwell,D., Delesalle,V.A., Garlena,R.A., Russell,D.A., Pope,W.H., Jacobs-Sera,D., Hendrix,R.W. and Hatfull,G.F.
40	2017	<b>Apocalypse</b> (Mycobacteriophage)	MF668267	Loney,R.E., Wentworth,H.A., Hanna,I.R., Delesalle,V.A., Grose,J., Hope,S., Breakwell,D., Garlena,R.A., Russell,D.A., Pope,W.H., Jacobs-Sera,D., Hendrix,R.W. and Hatfull,G.F.
41	2016	<b>Petruchio</b> (Mycobacteriophage)	KY213952	King,R.D., Delesalle,V.A., Grose,J., Hope,S., Breakwell,D., Garlena,R.A., Russell,D.A., Pope,W.H., Jacobs-Sera,D., Hendrix,R.W. and Hatfull,G.F.
42	2016	<b>Sabinator</b> (Mycobacteriophage)	KX808129	Wagner,J.D., Albritton,V.D., Beach,M.O., Bonner,C.T., Green,C.T., Harrell,M.L., Holder,G.D., Juneau,A.C., Labat,G.M., Lawrence,S.M., McCurry,A.D., Mouawad,M.A., Myers,D.S., Nowell,A.J., Palowsky,Z.R., Peoples,M.D., Peterson-Gross,L.E., Rizzo,E.R., Rybicki,S.K., Thomas,C., Vu,J.V., West,N., Williams,D.A., Morgan,G.B., Alonzo,F.L., Allison,W.D., Gissendanner,C.R., Findley,A.M., Sabin,D.S., Fisher,J.N., Lunt,B.L., Payne,D.E., Breakwell,D.P., Burnett,S.H., Klyczek,K., Garlena,R.A., Russell,D.A., Pope,W.H., Jacobs-Sera,D., Hendrix,R.W. and Hatfull,G.F.
43	2015	<b>phiN3</b> (Sinorhizobium phage)	NC_028945	Hodson,T.S., Hyde,J.R., Schouten,J.T., Crockett,J.T., Smith,T.A., Merrill,B.D., Crook,M.B., Griffiths,J.S., Burnett,S.H., Grose,J.H. and Breakwell,D.P.
44	2015	<b>phiM19</b> (Sinorhizobium phage)	KR052481	Crockett,J.T., Hodson,T.S., Hyde,J.R., Schouten,J.T., Smith,T.A., Merrill,B.D., Crook,M.B., Griffiths,J.S., Burnett,S.H., Grose,J.H. and Breakwell,D.P.
45	2015	<b>phiM7</b> (Sinorhizobium phage)	KR052480	Schouten,J.T., Crockett,J.T., Hodson,T.S., Hyde,J.R., Smith,T.A., Merrill,B.D., Crook,M.B., Griffiths,J.S., Burnett,S.H., Grose,J.H. and Breakwell,D.P.
46	2015	<b>Jenst</b> (B. laterosporus phage)	KT151955	Taylor, A.S., Wienclaw, T.M., Schoenhals, J. E., Graves, K.A., Merrill, B.D., Ward, A.T., Esplin, I.D., Breakwell, D.P., Grose J.H. and Burnett, S.H.
47	2015	<b>Osiris</b> (B. laterosporus phage)	KT151956	Newey, E.N., Schouten, J., McBride, M.S., Hilton J.A., Heaton, K.E., Crockett, J.T., Esplin, K.P., Hyde, J.R., Brundage, B.M., Thurgood, T.L., Evans, M.R., Simister, A.R., Merrill, B.D., Ward, A.T., Burg, J.A., Schoenhals, J. E., Graves, K.A., Breakwell, D.P., Grose J.H. and Burnett, S.H.
49	2015	<b>SecTim467</b> (B. laterosporus phage)	KT151957	Beckstead, A.P., Schouten, J., McBride, M.S., Hilton J.A., Heaton, K.E., Crockett, J.T., Esplin, K.P., Hyde, J.R., Brundage, B.M., Thurgood, T.L., Evans, M.R., Simister, A.R., Merrill, B.D., Ward, A.T., Burg, J.A., Schoenhals, J. E., Gardner, A.V., Graves, Breakwell,

50	2015	<b>Powder</b> ( <i>B. laterosporus</i> phage)	KT151958	D.P., Grose J.H. and Burnett, S.H. Wienclaw, T.M., Kruger, J.L., Bairett, S.R., Ingersoll, K., Grossarth, S.E., Ransom, E.K., Berg, J.A. Harbaugh, K., Jensen, G.L., Ashcroft, C.R., Taylor, A.S., Graves, K.A., Schoenhals, J. E., Esplin, I.D., Merrill, B.D., Ward, A.T., Breakwell, D.P., Grose J.H. and Burnett, S.H., Bradley, K.W., Clarke, D.Q., Lewis, M.F., Barker, L.P., Bailey, C., Asai, D.J., Garber, M.L., Bowman, C.A., Russell, D.A., Pope, W.H., Jacobs-Sera, D., Hendrix, R.W., and Hatfull, G.F.
51	2015	<b>Sundance</b> ( <i>B. laterosporus</i> phage)	KT151959	Wienclaw, T.M., Burg, J.L., Graves, K.A., Hilton, J.A., Buckley, A.L., Ward, A.T., Merrill, B.D., Grose J.H., Breakwell, D.P., and Burnett, S.H., Bradley, K.W., Clarke, D.Q., Lewis, M.F., Barker, L.P., Bailey, C., Asai, D.J., Garber, M.L., Bowman, C.A., Russell, D.A., Pope, W.H., Jacobs-Sera, D., Hendrix, R.W., and Hatfull, G.F. Meadows, H.N., Fisher, J.N.B., Gardner, A.V., Merrill, B.D., Hartmann, K.A., Bailey, M.E., Beckstead, A.P., Deus, L.M., Earl, A.S., Easter, R.A., Gibby, P.D., Graves, K.A., Ayer, P.A., Heiner, M.E., Herring, J.A., Jaen, A.D., Liu, J.E., Mancini, A.M., Nielsen, D.A., Paz, H.C., Sabin, N.R., Solomon, M.B., Sutter, R.A., Wake, B.N., Willyerd, H.J., Zimmerman, L.J., Breakwell, D.P., Burnett, S.H., Grose, J.H., Bradley, K.W., Clarke, D.Q., Lewis, M.F., Barker, L.P., Bailey, C., Asai, D.J., Garber, M.L., Bowman, C.A., Russell, D.A., Pope, W.H., Jacobs-Sera, D., Hendrix, R.W. and Hatfull, G.F.
52	2014	<b>Phantastic</b> ( <i>Mycobacteriophage</i> )	KJ510415	Sheflo, M.A., Gardner, A.V., Merrill, B.D., Fisher, J.N., Lunt, B.L., Breakwell, D.P., Grose, J.H. and Burnett, S.H.
53	2013	<b>Jimmer1</b> ( <i>B. laterosporus</i> phage)	KC595515	Sheflo, M.A., Gardner, A.V., Merrill, B.D., Fisher, J.N., Lunt, B.L., Breakwell, D.P., Grose, J.H. and Burnett, S.H.
54	2013	<b>Jimmer2</b> ( <i>B. laterosporus</i> phage)	KC595514	Sheflo, M.A., Gardner, A.V., Merrill, B.D., Fisher, J.N., Lunt, B.L., Breakwell, D.P., Grose, J.H. and Burnett, S.H.
55	2013	<b>Abouo</b> ( <i>B. laterosporus</i> phage)	KC595517	Sheflo, M.A., Gardner, A.V., Merrill, B.D., Fisher, J.N., Lunt, B.L., Breakwell, D.P., Grose, J.H. and Burnett, S.H.
56	2013	<b>Davies</b> ( <i>B. laterosporus</i> phage)	KC595518	Sheflo, M.A., Gardner, A.V., Merrill, B.D., Fisher, J.N., Lunt, B.L., Breakwell, D.P., Grose, J.H. and Burnett, S.H.
57	2013	<b>Emery</b> ( <i>B. laterosporus</i> phage)	KC595516	Sheflo, M.A., Gardner, A.V., Merrill, B.D., Fisher, J.N., Lunt, B.L., Breakwell, D.P., Grose, J.H. and Burnett, S.H.
58	2013	<b>JL</b> ( <i>B. cereus</i> phage)	KC595512	Lloyd, J., Fisher, J.N.B., Gardner, A.V., Hallam, S.J., Jensen, J.D., Pettersson, S.M., Smith, C., Sullivan, S., Brighton, A.K., Sheflo, M.A., Burnett, S.H., Breakwell, D.P. and Grose, J.H.
59	2013	<b>Basilisk</b> ( <i>B. cereus</i> phage)	KC595511	Jensen, J.D., Fisher, J.N.B., Gardner, A.V., Irons, D.L., Lloyd, J., Pettersson, S.M., Smith, C., Sullivan, S., Brighton, A.K., Sheflo, M.A., Burnett, S.H., Breakwell, D.P. and Grose, J.H.
60	2013	<b>Shanette</b> ( <i>B. cereus</i> phage)	KC595513	Pettersson, S.M., Fisher, J.N.B., Gardner, A.V., Hallam, S.J., Jensen, J.D., Lloyd, J., Smith, C., Sullivan, S., Brighton, A.K., Sheflo, M.A., Burnett, S.H., Breakwell, D.P. and Grose, J.H.
61	2013	<b>Adawi</b> ( <i>Mycobacteriophage</i> )	KF279411	Adawi, E.C., Merrill, C.A., Sargent, C.J., Fisher, J.N., Gardner, A.V., Lunt, B.L., Merrill, B.D., Breakwell, D.P., Burnett, S.H. and Grose, J.H.
62	2013	<b>Bane1</b> ( <i>Mycobacteriophage</i> )	KF279412	Marlow, S., Merrill, C.A., Sargent, C.J., Fisher, J.N., Gardner, A.V., Lunt, B.L., Merrill, B.D., Burnett, S.H., Grose, J.H. and Breakwell, D.P.
63	2013	<b>Bane2</b> ( <i>Mycobacteriophage</i> )	KF279413	Gardner, A.V., Merrill, C.A., Sargent, C.J., Fisher, J.N., Lunt, B.L., Merrill, B.D., Burnett, S.H., Grose, J.H. and Breakwell, D.P.
64	2013	<b>Fredward</b> ( <i>Mycobacteriophage</i> )	KF279414	Ladle, K.C., Fisher, J.N.B., Gardner, A.V., Lunt, B.L., Breakwell, D.P., Grose, J.H. and Burnett, S.H.
65	2013	<b>Quink</b> ( <i>Mycobacteriophage</i> )	KF279417	Vance, K.S., Kiser, C.D., Earl, A.S., Hansen, A.W., Merrill, C.A., Sargent, C.J., Fisher, J.N., Gardner, A.V., Lunt, B.L., Merrill, B.D., Breakwell, D.P., Burnett, S.H. and Grose, J.H.
66	2013	<b>PhrostyMug</b> ( <i>Mycobacteriophage</i> )	KF279415	Hansen, A.W., Irons, D.L., Sargent, C.J., Fisher, J.N., Gardner, A.V., Lunt, B.L., Merrill, B.D., Payne, I.D.A.V.I.D., Breakwell, D.P., Grose, J.H. and Burnett, S.H.
67	2013	<b>SargentShorty9</b> ( <i>Mycobacteriophage</i> )	KF279416	Sargent, C.J., Merrill, C.A., Fisher, J.N., Gardner, A.V., Lunt, B.L., Merrill, B.D., Payne, I.D., Breakwell, D.P., Grose, J.H. and Burnett, S.H.
68	2013	<b>Anubis</b> ( <i>Mycobacteriophage</i> )	NC_029018	Jackson, KR, Lunt, BL, Fisher, JN, Garner, AV, Bailey, ME, Deus, LM, Earl, AS, Gibby, PD, Hartmann, KA, Liu, JE, Mancini, AM, Nielsen, DA, Solomon, MB, Breakwell, DP, Burnett, SH, and Grose, JH.
69	2013	<b>Alex</b> ( <i>Mycobacteriophage</i> )	JX649100	Benedict, A.B., Fisher, J.N.B., Gardner, A.V., Lunt, B.L., Payne, D.E., Burnett, S.H., Breakwell, D.P. and Grose, J.H.
70	2013	<b>Gyarad</b> ( <i>Mycobacteriophage</i> )	JX649099	Ladle, K.C., Fisher, J.N.B., Gardner, A.V., Lunt, B.L., Breakwell, D.P., Grose, J.H. and Burnett, S.H.
71	2013	<b>Nacho</b> ( <i>Mycobacteriophage</i> )	JX649098	Kartchner, B.J., Fisher, J.N.B., Gardner, A.V., Lunt, B.L., Grose, J.H., Burnett, S.H. and Breakwell, D.P.

72	2013	<b>Piglet</b> (Mycobacteriophage)	JX649097	Barrus,E.Z., Adawi,E.C., Kennedy,A.K., Poe,D.E., Williams,K.R., Fisher,J.N.B., Gardner,A.V., Merrill,B.D., Grose,J.H., Burnett,S.H. and Breakwell,D.P.
73	2013	<b>Serpentine</b> (Mycobacteriophage)	JX649096	Brighton,A.K., Fisher,J.N.B., Gardner,A.V., Lunt,B.L., Breakwell,D.P., Burnett,S.H. and Grose,J.H.
74	2012	<b>Aeneas</b> (Mycobacteriophage)	JQ809703	Morrell,J.D., Brighton,A.K., Fisher,J.N.B., Sheflo,M.A., Adawi,E.C., Christiansen,M.R., Ferguson,N.C., Gardner,A.V., Irons,D.L., Jensen,J.D., Kennedy,A.K., Lloyd,J.S., Marlow,S.C., Mason,S.J., McCord,T.M., Merrill,B.D., Nelson,E.P., Norton,C.S., Petterson,S.M., Poe,D.E., Russell,R.C., Smith,T.C., Sullivan,S., Williams,K.R., Breakwell,D.P., Grose,J.H., Burnett,S.H., Wang,X., Crowell,R., Bostrom,M.A., Burke,M., Wright,G.M., Gregory,S.G., Colman,S.D., Bradley,K.W., Khaja,R., Lewis,M.F., Barker,L.P., Asai,D.J., Bowman,C.A., Russell,D.A., Pope,W.H., Jacobs-Sera,D., Hendrix,R.W. and Hatfull,G.F.
75	2012	<b>Fezzik</b> (Mycobacteriophage)	JN600672	Woodward,T.J., Daetwyler,M.E., Fisher,J.N.B., Lunt,B.L., Sheflo,M.A., Payne,D.E. II, Breakwell,D.P., Burnett,S.H. and Grose,J.H.
76	2012	<b>KLucky39</b> (Mycobacteriophage)	JF704099	Haskell,K.J., Giri,I., Issac,T.F., Liechty,Z.S., Daetwyler,M.E., Bull,L.A., Payne,D.E. II, Lunt,B.L., Argueta,L.B., Bajgain,P., Benedict,A.B., Earley,B.J., Engle,J.M., Fisher,J.N., Greenhalgh,E., Hansen,A.W., Ladle,K.C., Petersen,S.K., Sabin,D.S., Sargent,C.J., Severson,M.C., Smith,K.C., Taylor,M.A., Woodward,T.J., Wright,B.A., Burnett,S.H., Breakwell,D.P., Zhang,X., Meincke,L.J., Goodwin,L.A., Dettner,J.C., Han,S., Green,L.D., Bradley,K.W., Khaja,R., Lewis,M.F., Barker,L.P., Jordan,T.C., Russell,D.A., Leuba,K.D., Fritz,M.J., Bowman,C.A., Pope,W.H., Jacobs-Sera,D., Hendrix,R.W. and Hatfull,G.F.
77	2012	<b>Nepal</b> (Mycobacteriophage)	JQ698665	Bajgain,P., Fisher,J.N.B., Lunt,B.L., Sheflo,M.A., Brighton,A.K., Adawi,E.C., Christiansen,M.R., Ferguson,N.C., Gardner,A.V., Irons,D.L., Jensen,J., Kennedy,A., Lloyd,J.S., Marlow,S., Mason,S.J., McCord,T.M., Merrill,B.D., Nelson,E.P., Norton,C.S., Petterson,S.M., Poe,D.E., Russell,R.C., Smith,T.C., Sullivan,S., Williams,K.R., Burnett,S.H., Breakwell,D.P. and Grose,J.H.
78	2012	<b>Shauna1</b> (Mycobacteriophage)	JN020141	Sheide,M.G., Fisher,J.N., Lunt,B.L., Smith,K.C., Taylor,M.A., Baker,B., Barrus,E.Z., Brighton,A.K., Chapman,K.M., Drake,E.A., Jackson,K.R., Kartchner,B.J., Kiser,C.D., Kiser,J.T., Kitchen,J.C., McDaniel,S.W., Ormsby,W.R., Parker,M., Steck,R.P., Vance,K.S., Breakwell,D.P., Burnett,S.H., Grose,J.H., Wang,X., Crowell,R., Burke,M., Wright,G.M., Gregory,S.G., Colman,S.D., Bradley,K.W., Khaja,R., Lewis,M.F., Barker,L.P., Jordan,T.C., Russell,D.A., Pope,W.H., Jacobs-Sera,D., Hendrix,R.W. and Hatfull,G.F.
79	2012	<b>TA17A</b> (Mycobacteriophage)	JN400277	Lunt,B.L., Payne,D.E., Fisher,J.N.B., Smith,K.C.B., Taylor,M.R., Baker,B., Barrus,E.Z., Brighton,A.K., Chapman,K.M., Drake,E.A., Jackson,K.R., Kartchner,B.J., Kiser,C.D., Kiser,J.T., Kitchen,J.C.B., Mcdaniel,S.W., Ormsby,W.R., Parker,M., Sheide,M.G., Steck,R.P., Vance,K.S., Breakwell,D.P., Burnett,S.H. and Grose,J.H.
80	2011	<b>AnnaL29</b> (Mycobacteriophage)	JN572060	Lunt,B.L., Sheflo,M.A., Fisher,J.N.B., Breakwell,D.P., Burnett,S.H. and Grose,J.H.
81	2011	<b>JEBKS</b> (Mycobacteriophage)	JN572061	Earley,B.J., Engle,J.M., Smith,K.C., Lunt,B.L., Fisher,J.N.B., Payne,D.E. II, Breakwell,D.P., Burnett,S.H. and Grose,J.H.
82	2010	<b>Redrock</b> (Mycobacteriophage)	GU339467	Jacobs-Sera,D., Zellars,M., Wells,M.E., Webb,J.L., Ware,V.C., Vazquez,E., TamarapuParthasarathy,P., Smith,I.A., Simon,S.E., Shaffer,C.D., Rubin,M.R., Rosenzweig,R.F., Rinehart,C.A., Qin,H., Pillay,I., Payne,D.E. II, Padolina,J.M., Novick,P.A., Miller,E.S., Mayer,E.S., Marzillier,J.Y., Mageeney,C.M., MacGibeny,M.A., Li,W., Lee,J.Y., Kinnersley,M.A., King-Smith,C., King,R.A., Kenna,M.A., Kearsse,M.G., Johnson,B.K., Johnson,A.A., Johnson,C.M., Hughes,L.E., Harrison,M., Guild,N.A., Gilbert,J.L., Fillman,C.L., Felton,C.M., Dunbar,D.A., Dennehy,J.J., DeJong,R.J., Carson,S., Burnett,S.H., Breakwell,D.P., Berrios,J.E., Benjamin,R.C., Anderson,J.J., Bradley,K.W., Khaja,R., Lee,E., Barker,L.P., Lewis,M.F., Jordan,T.C., Cresawn,S.G., Grace,M.A., Pope,W.H., Ko,C., Russell,D.A., Peebles,C.L., Lawrence,J.L., Hendrix,R.W. and Hatfull,G.F.

## RESEARCH PRESENTATIONS (presenters in bold, 92 presentations, all but 17 have undergraduate student authors)

- Bowden LC**, DeMordaunt N, Solorio A, Arias M, Jensen BD, Bowden AE, Hope S. (2022) Osteocyte Growth on Carbon-Infiltrated Carbon Nanotubes vs. Medical Grade Titanium Alloy. Orthopaedic Research Society, Tampa, FL.
- DeMordaunt N**, **Solorio A**, Bowden LC, Arias M, Jensen BD, Hope S. (2022) Attachment of human osteoblasts and methicillin-resistant *Staphylococcus aureus* is affected by the surface type used for human implants. Utah Conference on Undergraduate Research, St. George, UT

3. **DeMordaunt N, Solorio A**, Bowden LC, Arias M, Jensen BD, Hope S. (2022) Attachment of human osteoblasts and methicillin-resistant *Staphylococcus aureus* is affected by the surface type used for human implants. 3<sup>rd</sup> place award, poster competition, Biomedical Engineering Research Conference, Provo, UT.
4. **Obray JD**, Brundage J, Clarke T, Stockard A, Richmond B, Hope S, Yorgason JT, Steffensen SC (2019) Acute ethanol influences monocyte infiltration of CNS and alters microglia phenotype. Abstract in *Alcoholism: Clinical and Experimental Research*.
5. **Monroe JA**, Bowden L, Hope S, Jensen BD, Bowden AE (2019) Carbon-infiltrated carbon nanotube surface enhancement of stainless steel stimulates adhesion in human osteoblasts. Orthopaedic Research Society, Phoenix, AZ.
6. **Roll CR**, Arnold C, Obray JD, Steffensen SC, Mitchell UH, Hope S (2019) Effect of Parkinson's Disease on expression of dopamine D2 receptors in peripheral blood leukocytes. ASM Intermountain Branch Meeting, Brigham Young University, Provo, UT.
7. **Roll CR**, Arnold C, Obray JD, Steffensen SC, Mitchell UH, Hope S (2018) Effect of Parkinson's Disease on expression of dopamine D2 receptors in peripheral blood leukocytes. Autumn Immunology Conference, Chicago, IL.
8. **Obray JD**, Parsons M, Lattin J, Clarke T, Jang EY, Hope S, Yang CH, Yorgason JT and Steffensen SC. (2018) Ethanol enhancement of dopamine release in the nucleus accumbens and ethanol reward is mediated by peripheral neuroimmune interactions. *Alcoholism: Clin. Exp. Res.* 42(S1) 032.
9. **Clarke T**, Obray JD, Brundage J, Lattin J, Williams S, Yorgason JT, Hope S and Steffensen SC (2018) Acute ethanol increases monocyte infiltration of CNS and influences microglia phenotype. *Alcoholism: Clin. Exp. Res.* 42(S1) 021.
10. **Fajardo C**, Meredith S, Roll C, Griffiths JS, Hope S, Grose JH, and Breakwell DP. (2018) Proof of Concept: Determining Phage Adsorption Using Flow Cytometry. ASM Tri-Branch Mtg, Durango, CO.
11. **Whitlock T**, Greene N, Creaser I, Knowles A, Karlinsey D, Nelson N, Barton K, Bateman J, Quist N, Hendrickson J, Ellis K, Chamberlain N, Jenkins J, Fajardo C, Fuhrman DA, Griffiths JS, Hope S, Grose JH, and Breakwell DP. (2018) The genomes of CW76, a unique phage, and XTREME, a T4-like phage infecting *Sinorhizobium meliloti*. ASM Tri-Branch Meeting, Fort Lewis College, Durango, CO.
12. **Creaser I**, Knowles A, Karlinsey D, Nelson N, Barton K, Bateman J, Quist N, Hendrickson J, Ellis K, Chamberlain N, Fajardo C, Fuhrman DA, Griffiths JS, Hope S, Grose JH, and Breakwell DP (2018) Host Range and Receptor Binding of 13 Newly-Isolated Phages Infecting *Sinorhizobium meliloti*. ASM Tri-Branch Meeting, Fort Lewis College, Durango, CO.
13. **Anderson K**, Barker A, Carroll M, Hogan T, Nieman T, Parsons M, Simister A, Steffensen A, Todd J, Breakwell DP, Hope S and Grose JH (2018) Screening for antibiotic-resistance genes in a sewage phage population. ASM Tri-Branch Meeting, Fort Lewis College, Durango, CO.
14. **Melhado E**, Chow J, Wiley M, Sarabia R, Standing N, Breakwell DP, Hope S and Grose JH (2018) Isolation and Characterization of Sewage Phages. ASM Tri-Branch Meeting, Fort Lewis College, Durango, CO.
15. **Hyer MG**, Call JJ, Dawson DD, Chronis JD, Ayala MA, Finnegan Z, Fox A, Hielscher T, Yeates EL, Breakwell DP, Hope S and Grose JH (2018) Identification of promiscuous sewage phage. ASM Tri-Branch Meeting, Fort Lewis College, Durango, CO.

16. **Potts E**, Sirrine M, Meeks T, Rodriguez W, Wilkey A, Tovar K, Porter M, Lambert A, Yeates E, Breakwell DP, Hope S and Grose JH (2018) Safe and effective phage therapy. ASM Tri-Branch Meeting, Fort Lewis College, Durango, CO.
17. **Brady S**, Hope S (2017) *Phage binding to Paenibacillus larvae spores*. Oral Presentation. North American Pollinator Protection Campaign, Washington, D.C.
18. **Gregory N**, Warner N, Hanks B, Jensen B, Hope S (2017) *Measurement of Nanoinjection Delivery Through Radiotagged DNA and Enucleation*. Oral Presentation. ASME Design Engineering Technical Conference, Cleveland, OH.
19. **Williams SB**, Pistorius SS, Anderson EQ, Clarke DR, Clarke TJ, Hope S, Steffensen SC (2017) *Acute ethanol activates microglia and affects the excitability of ventral tegmental area neurons*. Society of Neuroscience, Washington D.C.
20. **Obray D**, **Clarke T**, Jang EY, Garcia B, Klomp A, Richardson AI, Payne A, Hope S, Yang CH, Yorgason J, Steffensen SC (2017) *Ethanol enhancement of dopamine release in the nucleus accumbens and ethanol reward are mediated by peripheral neuroimmune interactions*. Society of Neuroscience, Washington D.C.
21. **Obray D**, Jang EY, Garcia B, Payne A, Hope S, Yang CH, Yorgason J, Steffensen SC (2017) *Ethanol enhancement of dopamine release*. Alcoholism: Clin & Exp Res. Denver, CO.
22. **Duncan S**, **Hurst E**, Berg J, Ward A, Hilton J, Breakwell D, Grose J, Hope S. (2016) *Paenibacillus Larvae Phages Contain Regions of Conserved Synteny Despite Large Genomic Differences*. Poster presentation. 8<sup>th</sup> Annual SEA-Phages Symposium, Ashburn, VA.
23. Harris N, Hurst E, James B, Pollock SV, Smith H, **Webb CJ**, Berg J, Fajardo C, Hilton J, Ward A, Breakwell D, Gross J, Hope S. (2016) *Genomic Characterization of Honeybear and Related Phage Toothless*. ASM Intermountain Branch Meeting, University of Utah, Salt Lake City, UT.
24. **Steffensen SC**, Jang EU, Park HJ, Garcia B, Burton GF, Burnett SH, Lee JG, Yang CH. (2015) *Dopamine D2 receptors as peripheral biomarkers for brain dopamine levels and as targets for modulating brain dopamine*. Society for Neuroscience, Chicago, IL. *Soc. Neurosci Absts.* (40) 780.16.
25. **Hilton JA**, Merrill BD, Graves KA, Wake BN, Ward AT, Payne AM, Grose JH, Breakwell DP, Burnett SH. (2015) *Isolation of Bacteriophages Against P. larvae, the Cause of American Foulbrood in Honeybees*. 21<sup>st</sup> Biennial Evergreen International Phage Meeting, Olympia, WA.
26. **Berg J**, Esplin ID, Brundage BM, Crockett JT, Esplin KP, Evans MR, Heaton KE, Hilton JA, Hyde JR, McBride MS, Schouten JT, Simister AR, Thurgood TL, Merrill BD, Ward AT, Breakwell DP, Burnett SH, and Grose JH. (2015) *Isolation and Characterization of Paenibacillus larvae and Brevibacillus laterosporus Bacteriophages to Understand Their Evolutionary Relationship*. Poster presentation. 7<sup>th</sup> Annual SEA-Phages Symposium, Ashburn, VA.
27. **Hilton JA**, Schouten JT, Berg JA, Merrill BD, Ward AT, Breakwell DP, Grose JH, Burnett SH. (2015) *Discovery of Two Novel Phage Clusters in Brevibacillus laterosporus Using Comparative Genomics*. ASM Intermountain Branch Meeting, Fort Lewis College, Durango, CO.
28. **McBride MS**, Evans MR, Brundage BM, Merrill BD, Berg JA, Ward AT, Grose JH, Breakwell DP, Burnett SH. (2015) *Comparing Protein Structures of a Transcriptional Regulator Repeated in Brevibacillus Phages*. ASM Intermountain Branch Meeting, Fort Lewis College, Durango, CO.
29. **Crockett JT**, Esplin KP, Hyde JR, Merrill BD, Berg JA, Ward AT, Breakwell DP, Grose JH, Burnett SH. (2015) *Brevibacillus Bacteriophages Xane and Jenst Reveal a DNA Motif Indicating a Gene Regulatory Sequence*. ASM Intermountain Branch Meeting, Fort Lewis College, Durango, CO.



30. **Thurgood T**, Simister A, Heaton K, Merrill BD, Berg JA, Ward AT, Grose JH, Breakwell DP, Burnett SH. (2015) *Comparison of Brevibacillus laterosporus phages in an effort to more fully understand the genomic evolutionary changes that have occurred and effects on related organisms*. ASM Intermountain Branch Meeting, Fort Lewis College, Durango, CO.
31. **Jensen GL**, Berg JA, Esplin ID, Foy BM, Grossarth SE, Harbaugh K, Ingersoll K, Kruger JL, Peck MD, Ransom EK, Smith HG, Stratton JL, Breakwell DP, Burnett SH, Grose JH. (2014) *Isolation and characterization of eleven phages that infect Erwinia amylovora*. Oral presentation. 6<sup>th</sup> Annual SEA-Phages Symposium, Ashburn, VA.
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### **Nanoinjection for DNA delivery into cells**

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### **Public School Service**

5. Guest Instruction for ACT Science Section. Westlake High School ACT Prep Class, Saratoga Springs, UT. Nov 30 – Dec 3, 2021.
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### **Phages for treating American Foulbrood in honeybees**

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### **REFERENCES**

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