Phagedigging Helping Acquire Genuine Experiences in Science (PHAGES) Research Symposium

April 14-16, 2024

Fairmont Hot Springs

Contents

Welcome to the 2024 PHAGES Research Symposium

Esteemed Educators,

We would like to express our heartfelt gratitude for each of you and are proud to have you join us for the culminating Symposium for our Phages Helping Acquire Genuine Experiences in Science (PHAGES) project. Since 2019, many of you have experienced both struggles and joys as you participated in intensive summer research academies and scheduled PHAGES leaders for your classroom visits. You not only assisted us during the phage-discovery experiments, but developed the knowledge and confidence to independently prepare and deliver the three-day classroom experiment. You inspired your students to conduct research projects, continuing this work. Along with the close PHAGES teacher partnerships within your school, you have established a community of outstanding science teachers across Montana who can rely upon each other now and for years to come. We hope that our shared efforts will pay dividends into the future.

We also would like to acknowledge the support and encouragement that each administrator has provided, including those from Montana Tech. Without support from the leadership from each middle and high school, this project would not have been possible. Thank you all for allowing class time for this project, totes of microbiology equipment to be rolled through the hallways, and us to streamline our student assessment process. As the science education field develops, understanding what works for students is critical. You enabled us to capture crucial student data and reflections, which we intend to share with broader audiences.

This event is truly a celebration of all that has been accomplished by each teacher, each school, and each district! We also welcome several former Montana Tech research participants as well as a high school teacher from across the county to share their phage journeys. We hope that you enjoy the symposium!

Thank you!!
Dr. Marisa Pedulla and Rayelynn Brandl

PHAGES Team

Dr. Marisa Pedulla

Montana Technological University

Dr. Pedulla received her B.S. in Chemistry with a bioscience option at the University of Pittsburgh with coursework including studies in French and Japanese. She received her Ph.D. in Biology at the University of Pittsburgh in the laboratory of Dr. Graham Hatfull. After a brief postdoctoral position at Washington State University, she ran the Phage Genomics facility at the Pittsburgh Bacteriophage Institute and co-developed a phage discovery program with Dr. Graham Hatfull.

Dr. Pedulla brought phage discovery to teachers and students across Montana beginning as an assistant professor of Biology at Montana Tech in 2005. Over 50 Montana K-12 teachers and 13,000 students have participated in her phage discovery program. She has been awarded several significant research grants, including two NIH SEPA grants in collaboration with CFWEP.org entitled "Bringing Research Into the Classroom," and “Phages Helping Acquire Genuine Experiences in Science,” and recently an NSF Major Research Instrumentation grant to acquire a multifunctional transmission electron microscope with which to image the student-discovered phages.

Dr. Pedulla is a Fellow of the American Association for the Advancement of Science and a member of Sigma Xi, The Scientific Research Society, and the American Society for Microbiology. Dr. Pedulla was named the 2007 Carnegie Foundation for the Advancement of Teaching and the Council for Advancement and Support of Education Montana Professor of the Year.

Recent awards include: 2023 Montana Tech Distinguished Researcher Award; 2023 Montana Tech Faculty Merit Award for Exceptional Achievement in Service and Scholarship; 2022 Montana Tech College of Letters Science Professional Studies Faculty Community Engagement Award; 2019 Fellow, American Association for the Advancement of Science; 2019 Montana Tech Acknowledgement of Excellence Award for University Ambassador; 2019 Montana Tech Faculty Merit Award for Service.

PHAGES Team

Rayelynn Brandl

Clark Fork Watershed Education Program

Rayelynn is the Executive Director of the Clark Fork Watershed Education Program. She is the PHAGES program director for Dr. Pedulla's NIH SEPA award. CFWEP has been providing teacher professional development since 2008. To date, the program has served over 900 teachers within the state of Montana.

Rayelynn has been recognized by the Montana Science Teachers Association for exemplary service to science education. She has received the Award of Excellence in Education by MSU Billings and was named by the National Science Teachers Association as the Distinguished Informal Science Educator for 2019. In addition, she has served on many state and regional boards and has been recognized for her service to local communities and the state.

Dr. Chris Pavlovich

Clark Fork Watershed Education Program

Chris Pavlovich holds a PhD in Curriculum and Instruction from Montana State University. She served as a 5th grade teacher for 14 years in Livingston, Montana. During her teaching tenure, Chris founded Watershed Warriors, a place-based, interdisciplinary watershed education program based on a mission of stewardship, application, and access. Her goal in science education is to engage teachers and students in place-based, project-based pedagogies to decrease the border between science and classrooms. She was named 2022 Montana Environmental Education Association Formal Educator of the Year; awarded the 2022 Presidential Innovation Award for Environmental Educators; awarded the Teresa Veltkamp Advocacy Award for Excellence in Indian Education in 2021; awarded Presidential Awards for Excellence in Math and Science Teaching in 2020; recognized by the Montana Science Teachers Association in 2018 for Distinguished Service to Science Education; named Montana Watershed Teacher of the Year by the Clark Fork Watershed Education Program in 2017; and awarded Montana Educator of the Year by the American Fisheries Society in 2013.

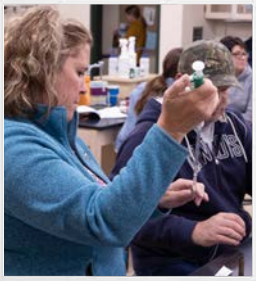
About PHAGES

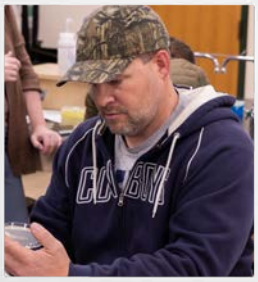
Phages are viruses that infect bacteria and can be useful tools for fighting antibiotic-resistant bacteria. They are the most numerous biological entities on the planet. PHAGES and participating teachers work directly with students in middle schools and high schools conducting 3-day phage discovery projects. Students and their teachers isolate phages from samples they collect from their local environment. If the students discover a phage, they choose a name the phage, and it is added to the database of phages at phagesdb.org. This three-day research experience engages students in relevant biomedical citizen science.

The Phages Helping Acquire Genuine Experiences in Science (PHAGES) project based at Montana Technological University in Butte, MT, has provided research experiences for Montana teachers and students since 2019. To date, PHAGES combined with its predecessor project, Bringing Research Into the Classroom (BRIC), has brought phage discovery to more than 13,000 Montana students, including those in some of Montana's most remote communities. The PHAGES project offered four years of intensive professional development for the 12 participating teachers and three years of 3-day in-class visits for their students. PHAGES teachers engaged in authentic research experiences with their students whose discoveries are included in national archival and databases. At the program's close, teachers have gained the practical knowledge and independently prepared materials and delivered the phage discovery in their classrooms.

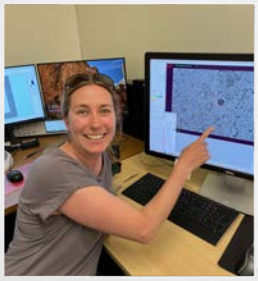
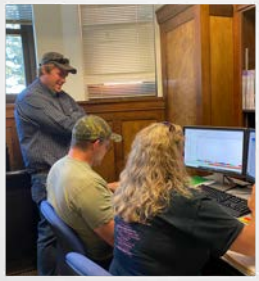
From Dr. Pedulla's outreach programs, combined, students have discovered over 130 new-to-science phages. All phages discovered in BRIC are included in the phagesdb.org database, 21 complete phage genomes have been sequenced and annotated, published in GenBank, the nation's sequence repository, with students and teachers included as authors.









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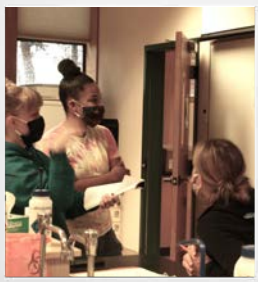
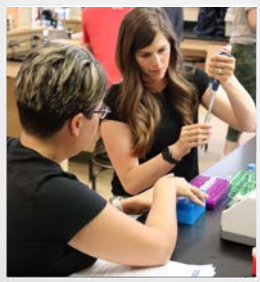




















Sunday, April 14: Agenda

All today's events will be held in the Sapphire Room

3:00	Check-in
5:00	Welcome Reception/PHAGES Poster Gallery
5:45	Introduction, Dr. Marisa Pedulla, PHAGES Principal Investigator, and Rayelynn Brandl, Program Director.
6:00	Keynote Speaker, Dr. Jack Skinner, Head of Montana Tech Nanotech Laboratory; Chair, Department of Mechanical Engineering; Introduction by Dr. Michele Hardy, Interim Provost and Executive Vice Chancellor
7:00	Adjourn

Monday, April 15: Agenda

8:00	**Breakfast - Sapphire Room**
	All Speakers & Presentations will be in the Ponderosa Room
8:30	A Pedagogical Call to Action, Rayelynn Brandl, Executive Director, Clark Fork Watershed Education Program, PHAGES Program Director
9:00	History of PHAGES Discovery Outreach, Dr. Marisa Pedulla, Professor, Department of Biological Sciences, Montana Technological University, PHAGES Principal Investigator
9:30	Shannon Panisko, Senior Director of Development, Montana Technological University Foundation
10:00	**Break**
10:15	Kate Mattern, Instructor, Department of Biological Sciences, Montana Technological University/Former High School Teacher, Anaconda, MT
11:00	Steve and Connie McCauley, 9-12 and 6-8 Science Teachers, Jefferson High School and Boulder Elementary (Boulder, MT)
11:50	PIPELINE STUDENTS Kylie Marks, Jefferson High Graduate (Boulder, MT), Montana Tech Undergraduate Student majoring in Biochemistry, 2020 PHAGES Pipeline Student, 2021 PHAGES Pipeline Supervisor Skyler Smith, Jefferson High Student (Boulder, MT) 2022 and 2023 PHAGES Pipeline Student
12:20	**Lunch - Sapphire Room**
1:20	Sarah Urban and Jean Placko, 9-12 Science Teachers, Capital High School (Helena, MT)
2:10	PIPELINE STUDENT Peter Lund, Capital High School Graduate (Helena, MT), University of Utah Undergraduate Student, 2023 PHAGES Pipeline Student
2:30	Robin Hehn (Retired) and Blake Hoge, 9-12 Science Teachers, Columbus High School (Columbus, MT). Robin serves as PHAGES Teacher Liaison.
3:15	**Break**
3:30	Megan Lane & Jared Hunt, 7th Grade Science Teachers, C.R. Anderson Middle School (Helena, MT)
4:20	Dr. Linda Rost and Jessica Bogs, 9-12 and 6-8 Science Teachers, Baker High School and Baker Middle School (Baker, MT)
5:05	**Break**
5:20	Keynote, Robert Lester, Owner, Mountain King Industries Phagehunter from ages 10-18 (Elementary, Middle, High School), Graduate, Montana State University
6:30	**Celebration Dinner, Welcome by Montana Technological University Chancellor, Les Cook - Sapphire Room**

Tuesday, April 16: Agenda

8:00	**Breakfast - Sapphire Room**
	All Speakers & Presentations will be in the Ponderosa Room
8:30	Phagehunting from Afar, Bob Kuhn, Biotechnology Teacher, Innovation Academy, Alpharetta, GA
9:00	EARLY MT TECH PHAGEHUNTERS Casey McConnell, Montana Technological University
9:30	Dr. Andrew Ramstead, University of Utah, Montana Tech Undergraduate, PhD, Montana State University
10:10	Dr. Jason Park, Washington State University, Montana Tech Undergraduate and Montana Tech IMS graduate student Phage Researcher, PhD, Texas A&M, Postdoctoral Fellow Johns Hopkins University
10:50	**Break**
11:00	Dr. Kimberly Jenkins, Walter Reed National Military Medical Center, Montana Tech Undergraduate Phages Researcher, AuD, University of Maryland
11:45	PIPELINE STUDENTS Lenny Triem, Montana State University Undergraduate, Montana City K-8, Helena High Phagedigging Participant, 2022 PHAGES Pipeline Student at Montana State University Trent Wolfe, Montana State University PhD Student, Anaconda High School Phagedigging Participant, 2021 PHAGES Pipeline Student at Montana State University
12:15	**Lunch - Sapphire Room**
1:00	Hannah Robinson, Laboratory Operations Manager, Mesa Labs, Montana Tech Alumni, PHAGES Undergraduate Researcher/Pipeline Supervisor 2019-2021
1:40	Project Evaluations, Dr. Chris Pavlovich, Director of Program Services and Evaluation, Clark Fork Watershed Education Program
2:00	Photo Caption Takeaways, Dr. Marisa Pedulla, Professor, Department of Biological Sciences, Montana Technological University
2:15	**Summary/Awards Ponderosa Room**
2:45	**Wrap and Departure**

Sunday, April 14: Keynote Speaker Bio

Keynote Speaker, Dr. Jack Skinner, Director of the Montana Tech Nanotechnology Laboratory; Head of the Mechanical Engineering Department

Jack L. Skinner received the B.S. degree from Montana Tech, Butte, MT, in General Engineering with a Mechanical Engineering Option in 2000, the M.S. degree from Washington State University, Pullman, WA, in Mechanical Engineering in 2002, and the Ph.D. degree from the University of California, Davis, CA, in Mechanical Engineering in 2007. He was a graduate researcher with the Berkeley Sensor and Actuator Center (BSAC), Berkeley, CA, from 2004 to 2007, where he developed diffractive optical microsystems. From 2003 to 2012, he was with Sandia National Laboratories, Livermore, CA, where he was a Principal Member of the Technical Staff before accepting a position as Assistant Professor of Mechanical Engineering in the General Engineering Department at Montana Tech, Butte, MT, where he founded and has been the Head of the Mechanical Engineering Department since 2018. He has worked in the field of nanotechnology and microelectromechanical systems (MEMS) since 2001. His research interests include technological advancements in the understanding and application of nanoscale devices, materials, and methods. Dr. Skinner is the Founding Director of the Montana Tech Nanotechnology Laboratory, a 2,000 square foot facility consisting of a cleanroom and extensive nanoscale fabrication and characterization equipment.

Dr. Skinner is a member of the American Society of Mechanical Engineers (ASME), the Institute of Electrical and Electronics Engineers (IEEE), the Materials Research Society (MRS), the American Institute of Aeronautics and Astronautics (AIAA), and the American Society for Engineering Education (ASEE). He is a licensed professional engineer (WY/14963).

Monday, April 15: Speakers & Presenters Bios

9:30 Shannon Panisko

Shannon Sullivan Panisko is the Senior Director of Development for the Montana Tech Foundation. Shannon has been with the Montana Tech Foundation for nine years and works closely with Montana Tech academic departments and donors on major and planned giving opportunities. Shannon also leads a team that oversees annual giving, alumni engagement, stewardship, marketing, and scholarships. Shannon studied Professional and Technical Communications at Montana Tech and spent 18 years in Radio Broadcasting and Marketing before joining the Montana Tech Foundation in 2016.

10:15 Kate Mattern

Kate Mattern is an instructor at Montana Technological University where she is head of the Anatomy & Physiology courses. Before her position at MT Tech, she had 23 years in public education teaching grades 8-12 and adult education classes. She taught many different high school science, adjunct, and CTE courses throughout her time in Fernley, NV and Anaconda, MT. She has been an instructor and board member at the Montana Learning Center (MLC) for 12 years, has participated in the BRIC and PHAGES programs since their inception, has been involved with CFWEP for 18 years, and was an MJ Murdock Partner in Science. Kate created and ran Anaconda's HOSA Future Healthcare Professionals club, led the Anaconda Teacher's Union Local #502 as a negotiator and officer, developed curriculum for OPI, and has served as a trainer for CRISS (Creating Independence through Student owned Strategies), and SIM (Strategic Instruction Models). Kate has won many teaching and public service awards and has been a consistent advocate for scientific literacy and the importance of research in science education. Kate, a proud Butte native, lives in Butte with her 2 daughters and husband where life is full of three different dances for her youngest and navigating freshman year of college for her oldest. She loves to kayak, camp, cook, travel, and read.

11:00 Steve & Connie McCauley

Steve McCauley is a science teacher at Jefferson High School in Boulder, Montana. He started his teaching career in Wolf Point, Montana, but returned to his alma mater just a year later where he has spent the last 27 years. During this time, Steve has been a basketball and football coach, spent over 20 years as an advisor for the National Honor Society, and is currently the Science Olympiad coach at JHS. In the year 2000, his ecology classes were awarded five-thousand dollars for helping with fire reclamation in Darby, Montana and in Boulder. With these funds, Steve, his students, and the local community began the planning and construction of Jefferson High School's outdoor classroom facility. Furthermore, from 2009 to 2012, they constructed a Lewis and Clark themed native plant landscape with Montana's first ever Service-Learning Grant. While these facilities make a great outdoor science experience for students, all classrooms are welcome. Steve volunteers many hours to manage and maintain these outdoor facilities. Outside of school, he enjoys hunting, fishing, hiking, snowmobiling, and spending time with his family.

Connie McCauley has been a teacher at Boulder Elementary School for 23 years. She was hired as a Kindergarten teacher and after 15 years, was moved to Junior High and is currently teaching science, math and geography. Even though this was a big leap in instruction, she embraced the challenge and, to help in her instruction, received her Master's Degree in Secondary Science Education in 2023. She has been a Junior High volleyball and track coach and is currently a co-advisor for BES Student Council. During her time as a Junior High teacher, she has collaborated with the first grade teacher to build relationships with their students. Recently, BES was awarded two thousand dollars in a Smart School Grant given by the Department of Environmental Quality. Seventh grade students mentored and worked together with their first grade "buddies" in building bird feeders out of recyclable material and developing a living classroom growing bean plants. Connie's seventh graders are also assisting the third grade students in the "Hooked on Fishing" program offered and taught by the Fish Wildlife and Parks, learning all about fish and fishing in Montana. Outside of teaching, Connie dedicates her time to her husband Steve and their two amazing children, Carter and Emma.

Monday, April 15: Speakers & Presenters Bios cont.

11:50 Kylie Marks & Skylar Smith

Kylie Marks was born and raised in Montana City and is a 2020 graduate from Jefferson High School (Boulder, MT). She then went on to complete her first summer at Montana Tech with the PHAGES program as a Pipeline Student. Kylie continued her education at Montana Technological University, pursuing a bachelor's degree in Biochemistry and is expected to graduate in May 2024. During her undergraduate career, she continued research with Dr. Marisa Pedulla in the PHAGES program, conducted research at Montana State University through the INBRE program, and worked as a Research & Development Intern at Mesa Laboratories. Other than research and schoolwork, Kylie enjoys spending time with friends and family in the great outdoors of Montana snowmobiling, hiking, and boating at the lake.

Skylar Smith is at Jefferson High School. She has completed two summers in the SEPA-INBRE Research Scholar Program working with the purification, amplification, and annotation of mycobacteriophage Starcevich and becoming first author on the publication of the genome in the GenBank database. She enjoys volunteering and is very involved in her school's National Honor Society, and she is the Secretary/Treasurer of the Business Professionals of America Club. In her downtime, she enjoys traveling, snowboarding, hiking and fitness. She will be attending Montana Tech after graduation.

1:20 Sarah Urban & Jean Placko

Sarah Urban is an honors Biology 1 and AP Biology teacher at Capital High School in Helena, Montana. She is currently in her 22nd year of teaching and has a bachelor's degree in Cell Biology from Western Washington University, a Master in Teaching degree from Whitworth College, and a Master Certificate in Environmental Health from the University of Montana. Sarah is also a National Board-Certified Teacher in Adolescent and Young Adult Science (Biology focus). Sarah is currently involved with three SEPA projects including a lead PHAGES teacher, a REACH teacher (cardiovascular health through University of Montana), and a model teacher through 3D Molecular Designs in Wisconsin. Through these experiences she has brought hands-on and real-world research opportunities to her students. She is an advisor for the Capital High School Green Club and Science Club and is also an assistant cross-country coach. Her awards include 2020 NABT Montana Biology Teacher of the year, Let's Talk about Great Teachers Award recipient, Helena Education Foundation Distinguished Teacher, and 2023 Presidential Award for Excellence in Mathematics and Science Teaching finalist. When Sarah is away from "her kids" at school (all 110 of them), she spends time running, hiking, and spending time with her husband, Eric, and three teenage children (mostly at swim meets!)

Jean Placko teaches Biology 1 and Honors Biology 1 at Capital High School in Helena, MT. She has a Bachelor's degree in Environmental Studies from the University of Montana in Missoula Montana and a Master's Degree in Teaching Secondary Science from Lewis and Clark Graduate School of Education and Counseling from Portland Oregon. It is currently her 9th year of teaching in the classroom. She has coached Science Olympiad, Science Bowl, and Envirothon teams, as well as developed community-based science projects for students to collect data on air quality and aquatic invasive species. She has received grant funding for involving students in project-based field trips from the Walmart Community Foundation and Dr. Baker Science For Kids Foundation. Prior to classroom teaching, she worked for various science education organizations in the US and abroad. During that time, she was able to take part in several professional research projects, including observing whales in the Sea of Cortez, monitoring sea turtles and gigantic tortoises in the Galapagos Islands, and collecting grizzly bear hairs in Yellowstone National Park. As a mentee teacher in the PHAGES project, she has enjoyed learning more about phages, the application of them to health sciences, microbiology, and specific lab techniques. When not at work, she loves to adventure in the wilds via bike, ski, raft, and her own two feet. She enjoys cooking, traveling, drawing, painting, and continuing to learn more about the natural world.

Monday, April 15: Speakers & Presenters Bios cont.

2:10 Peter Lund

Peter Lund is pursuing an undergraduate degree in biology with an emphasis in microbiology at the University of Utah. He enjoys spending time outside with his family engaged in various activities, including skiing, kayaking, and camping. His primary interest in biology is protein structure and function, particularly with relation to antibiotic interaction. Currently, he collaborates with others studying the structure of the tyrosine receptor in Escherichia coli in Dr. Sandy Parkinson's lab. Past research experience includes the characterization and genome annotation of mycobacteriophages in Dr. Marisa Pedulla's lab at Montana Technological University. He plans to obtain a Ph.D. in microbiology following the conclusion of his undergraduate degree.

2:30 Robin Hehn & Blake Hoge

Robin graduated with a B.A. in Secondary Science Education with a biology emphasis from Concordia University, Portland Oregon in 1996 and began teaching high school biology at Portland Lutheran High School. In the late 1990's Robin received a Murdock Trust Grant that gave him the opportunity to work in the research lab of Dr. Peter Zuber at the Oregon Graduate Institute for two summers working with Dr. Zuber, Dr. Guolu Zheng, and other scientists. Some of that work was published in the Journal of Bacteriology (1999).
In 2001 Robin entered the fifth cohort of the Masters of Science in Science Education (MSSE) program at Montana State University in Bozeman. The coursework emphasis was on medically significant bacteria and viruses, molecular and microbiology, as well as lab work. He graduated from the Masters program in 2003. Robin continued to take relevant graduate science courses earning 30 graduate credits from various institutions.

During Robin's tenure as a science teacher at Roundup High School, he had all students complete science fair projects that were presented at the regional science fair in Billings annually. One high school student won the regional science fair award in Billings for his work researching invasive salt cedar trees and participated in the International Science Expo in Portland Oregon (2004).

Robin wrote and was awarded a grant to participate in a two week oceanography course at the Naval Academy. The oceanography lessons brought back to school allowed him to develop an elective oceanography class curriculum taught every other semester to high school students. From 2004 to 2021 he developed curriculum for and taught courses in ecology with emphasis on macroinvertebrate studies, geographical oceanography, astronomy, and lab bench based microbiology. He also taught dual credit biotechnology in collaboration with Flathead Valley Community College.

After retiring from public school teaching in 2021, Robin worked with Dr. Marisa Pedulla at Montana Tech to develop a phage discovery outreach program, connecting with reservation schools in the Flathead Valley as well as Big Sky high school near West Yellowstone. There he worked with the teachers and students completing three day workshops.

Blake Hoge is the upper division science teacher at Columbus High School, a position he has held for 10 years. He teaches annual sections of dual credit chemistry, dual credit organic chemistry, and physics along with rotating electives of remedial biology, microbiology, dual credit biotechnology, and anatomy & physiology. He is also the head football coach, assistant coach for both the middle and high school wrestling teams, and oversees the strength and conditioning program. Hoge earned a B.A. in Biology and an M.Ed. in Curriculum and Instruction with administrative licensure, both from the University of Montana. He has worked under the tutelage of mentor teacher Robin Hehn through the PHAGES program for the previous five years. HIs classroom is now a fully independent Phage satellite classroom.

Monday, April 15: Speakers & Presenters Bios cont.

3:30 Megan Lane & Jared Hunt

Megan Lane graduated from Montana State University with a B.S. in Biology and a B.S. in Secondary Education-Science Broadfield, and she later received her Master's in Secondary Biology Education through Western Governors University. After briefly teaching high school, she was hired at CR Anderson Middle School, where she discovered her deep passion for working with middle school students. Megan has now been teaching Biology and coaching Science Olympiad at CR Anderson for over twenty years. Professionally, she has especially enjoyed her Research Fellowship through the American Physiological Society, and she feels extremely lucky to have worked with Dr. Marisa Pedulla for the past nineteen years, including the NIH SEPA grants Bringing Research into the Classroom, and Phages Helping Acquire Genuine Experience in Science. In 2023 she was honored to be chosen as a Montana state finalist for the Presidential Award for Excellence in Mathematics and Science Teaching. Megan lives in Helena, MT with her husband and their three children, where she also owns and operates Megan Lane Photography. In her spare time, she loves reading, camping, and hunting.

Jared Hunt was born and raised in Helena, MT, and graduated from Capital High School. After high school he attended Carroll College and graduated with a BA in Elementary Education. He began his teaching journey in 2015 when he landed his current position, teaching 7th grade Life Science. He also spends his time coaching football, as well as, track and field for the Capital High Bruins and has done so for the past 10 years. In 2018, he was recruited into the Phage Phamily by his mentor, the amazing Megan Lane. He has more than enjoyed being a part of PHAGES and absolutely LOVES being able to share this experience with his students.

4:20 Dr. Linda Rost & Jessica Boggs

Linda Rost is the 2020 Montana Teacher of the Year and a national finalist. She teaches biology, anatomy and physiology, AP biology, chemistry, and science research at Baker High School in Baker, MT. In her seventeen-year career, twenty-six of her students have competed at national or international science competitions. One student placed 1st at the National Junior Science and Humanities Symposium in 2012 and another placed 3rd in 2019. Additionally, one placed 3rd at the Intel International Science and Engineering Fair, and four have placed 4th. Rost obtained a B.S. from New Mexico State University, an M.Ed. and M.S. from Montana State University, and a PhD in Curriculum and Instruction - STEM from Texas Tech University. She serves as a teacher leader for the NIH-SEPA PHAGES grant. She is a three-time winner of the Junior Science and Humanities Symposium Teacher Award, a four-time Continental Cares grant recipient, and the 2016 National Vernier Engineering Contest winner. In 2023, she received the NEA Foundation Excellence in Teaching Award for Montana, the Teresa Veltkamp Advocacy Award for Excellence in Indian Education, and finalist for the Presidential Award for Excellence in Science Teaching. She lives on a cattle and poultry ranch in Baker, MT with her husband and three children.

Jessica Boggs currently teaches life science and geography at Baker Middle School in Baker, MT. In her ten-year career, she has taught at many grade levels, including first, third, fifth, and seventh. Boggs obtained a Bachelors in Elementary Education with a minor in psychology and Masters in Elementary Education from the University of North Dakota in Grand Forks, ND. In her spare time, you can find her in the gym coaching volleyball. She has been the head volleyball coach for the Lady Spartans for the past four seasons. She lives in Baker, MT, with her husband and three children.

Monday, April 15: Speakers & Presenters Bios cont.

5:20 Robert Lester

Being born in Montana and raised in the mountains, Robert gained an appreciation for the natural world from a young age. Skiing with his mother and going on adventures with his father as a child shaped Robert's desires in life. As Robert got older, he began working in the Biology Department of Montana Technological University, thanks to the mentorship of Dr. Marisa Pedulla. This led to a love of research and many accomplishments including being a two time finalist at the Intel International Science and Engineering Fair. As Robert neared high school graduation, he came to a crossroads. Follow a passion for science and biology or live a more outdoor centered life. An outdoor life won out. After graduating with his bachelor's degree specializing in Snow Science from Montana State University, Robert committed himself to being the best mountain athlete possible, achieving a career as a sponsored skier, mountaineer, and full-time adventurer. As Robert has spent his life in nature, it became obvious to advocate for the sustainability and conservation of the natural world that has given him so much. Striving to safeguard the gifts bestowed upon us by the world. It's this goal which led him to create the Columbia River Canoe Project. A 1300 mile canoe expedition from the headwaters of the Clark Fork of the Columbia River to the Pacific Ocean executed to inspire stakeholders near and far to empower measurable improvements for the Columbia River's ecosystem and its future.

Tuesday, April 16: Speakers & Presenters Bios

8:30 Bob Kuhn

Bob Kuhn's formative years were spent in Pittsburgh, PA and Manassas, VA. He attended the University of Georgia for my B.S. and M.S. in micropaleontology. After a 3-year stint as an environmental scientist in Atlanta, GA, he went back to UGA to become certified as a teacher. He taught AP biology and 9th grade biology at Centennial High School in Roswell, GA for 22 years. It was there that Mr. Kuhn began "DNA Club" a biotechnology focused independent research club. He transferred to Innovation Academy STEM Magnet school and has been teaching there for 3 years, developing and teaching the beginning and advanced biotechnology courses and biotechnology research. Mr. Kuhn brought DNA Club to his new school, and it was there that a small team of 4 sophomores began isolating soil phages. His students found their first in 2022. They have added 4 new members to the club and brought the club's phage count up to seven! His hope is to expand the program and incorporate it into the second-year biotechnology course.

9:00 Casey McConnell

Casey A. McConnell is currently completing the last semester of studies required for a B.S. degree in biological sciences (focused in cellular and molecular biology) at Montana Technological University, with plans to pursue an Interdisciplinary Master of Science degree. She is currently a student researcher at Montana Technological University, where her research focuses on mycobacteriophage genomics, nanomaterials, and microbial host-virus interactions.

9:30 Dr. Andrew Ramstead

After growing up in Bozeman, Montana, Dr. Ramstead attended Montana Tech from 2004-2008 and received a BS in Chemistry. While at Montana Tech, he spent time in Dr. Marisa Pedulla's laboratory as an undergraduate doing research on Mycobacteriophages. After getting his undergraduate degree, he entered graduate school and received a PhD in Immunology and Infectious Diseases from Montana State University in 2014 while working in the laboratory of Dr. Mark Jutila. Dr. Ramstead is currently a postdoctoral researcher at the University of Utah Huntsman Cancer Institute in Salt Lake City where he studies how CD4+ T cells make cell fate decisions during immunization, infection, and cancer in the laboratory of Dr. Matthew Williams.

10:10 Dr. Jason Park

Dr. Park's research interests are how intracellular pathogens manipulate host cells to emerge as effective pathogens. This interest began from early training in microbiology with Dr. Marisa Pedulla and the Phage Digger program at Montana Tech. He went on to earn a Ph.D. in microbiology with Dr. Michael Benedik at Texas A&M University where he gained a larger interest in bacterial genetics and pathogen evolution. Dr. Park pursued postdoctoral training with Dr. Tamara O'Connor at Johns Hopkins University, School of Medicine where he explored how intracellular pathogens take on an almost virus-like lifestyle, using the model intracellular pathogen Legionella pneumophila. Using functional genomics, he examined how L. pneumophila adapted to various protozoan hosts and how these adaptations equipped the bacteria to emerge as a human pathogen. Dr. Park's interest in identifying novel intracellular host-specific adaptations led to a collaboration with Dr. Kelly Brayton at Washington State University studying the non-model organism, Anaplasma phagocytophilum. A. phagocytophilum is an intracellular pathogen that is transmitted with the bite of infected Ixodes scapularis ticks and can cause the disease Anaplasmosis, which effects both human and livestock health. Together, he and his team identified the first A. phagocytophilum secreted effector that is essential for survival in the tick vector. Dr. Park is currently an independent investigator and lead a lab at Washington State University, which he is continuing to study how A. phagocytophilum mediates host-pathogen interactions to adapt between mammalian and arthropod environments. By understanding how these bacteria transition between the tick vector and mammalian hosts, novel strategies may be developed that can intercept tick borne pathogen transmission to humans and livestock.

Tuesday, April 16: Speakers & Presenters Bios cont.

11:00 Dr. Kimberly Jenkins

Kimberly Jenkins received her doctorate in clinical audiologyfrom the University of Maryland in College Park, MD. She is currently a Clinical Audiologist at the Auditory and Speech Clinic at Walter Reed National Military Medical Center, serving as the Hearing Aid Program Manager, POC for IT issues within the clinic, a virtual health provider, and the POC for auditory processing evaluation and treatment within the National Capital Region. As a previous research audiologist, she remains heavily involved in several research protocols at Walter Reed related to evaluation of and treatment for subjective hearing issues in the presence of background noise.

11:45 Lenny Triem & Trent Wolfe

Lenny is a third-year student at MSU pursuing a B.A. in Microbiology with a Medical Laboratory Science option, a B.A. in Music, and additional coursework in biochemistry and data science. He has been working in the laboratory of Dr. Blake Wiedenheft as a researcher since 2022.Lenny was recently listed as co-author of Santiago-Frangos et al.'s 2023 Nature paper "Structure reveals why genome folding is necessary for site-specific integration of foreign DNA into CRISPR arrays" and is currently involved in research aimed at developing a novel viral diagnostic. In 2023, he received a grant to work at NIAID's Rocky Mountain Labs studying molecular interactions between Zika virus and host tissues. His work has been supported by the Wiedenheft lab, Montana INBRE, and MSU's USP program. Lenny is a member of the Phi Kappa Phi and Sigma Xi honor societies. Lenny has a great passion for classical music and has been principal cellist of the MSU Symphony Orchestra since 2021. He also has a passion for public service and the legislative process and is currently serving as a senator on MSU's student body senate. When attending middle school at Montana City School, Lenny was fortunate to participate in Dr. Pedulla's BRIC phage discovery program, sparking a lifelong curiosity of virology. When Lenny isn't playing music, studying, or performing research, he is enjoying the great Montana outdoors with friends and family.

Trent's passion for research sparked in high school while enrolled in Ms. Kate Mattern's Discover Biology course. Here, he participated in the Bringing Research into the Classroom (BRIC), Phagedigging, and Clark Fork Water Shed Education Program. This early exposure to research laid the foundation he needed to continue his education at Montana State University. During his undergrad, he was under the mentorship of Dr. Seth Walk where he worked as a lab assistant in the COVID-19 diagnostic lab on campus. Later, he became an INBRE scholar at MSU through the PHAGES pipeline. During this time, he dove headfirst into the realm of research and found a love for it. He graduated with a BS in Microbiology and is now embarking on the next chapter of his life as a Ph.D. candidate in Dr. Walk's lab. His dissertation research focuses on the impact antibiotics have on arsenic toxicity and quantifying the downstream immunotoxic effects. His journey in research would not have been possible if it weren't for the opportunities given to me from the PHAGES pipeline.

1:00 Hannah Robinson

Hannah Robinson currently works for Mesa Laboratories in Bozeman, MT as a Laboratory Operations Manager overseeing three labs within the Sterilization Disinfection Division (SDC). The three labs are involved with cultivating bacterial spores, inoculation of spores on various carriers, and testing biological indicators to provide values for certificates of analysis under ISO and FDA regulations. Prior to being a Laboratory Operations Manager, she was a Research & Development (R&D) Scientist for Mesa Labs, working on the development of new product lines and process improvement. As an R&D scientist Hannah helped in Mesa SDC's first product launch, Apex EZTest, a self-contained biological indicator for monitoring vaporized hydrogen peroxide sterilization. Prior to working at Mesa, she studied at Montana Technological university to obtain a Bachelor's in Cellular and Molecular Biology and a Master's degree in Interdisciplinary Studies (Molecular Biology and Industrial Hygiene). During her bachelor's degree she worked on undergraduate research projects under Dr. Pedulla characterizing numerous bacteriophages through propagation and bioinformatic analysis on their genomes. Her graduate research focused on editing the genome of a staphylococcal bacteriophage using Cas-CRISPR technology. Hannah currently resides with her husband and daughter in Bozeman and is expecting a baby boy this summer.

Notes

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