PATRICK R. SECOR, PhD

Montana State University
Department of Microbiology & Cell Biology
109 Lewis Hall – Bozeman, Montana – 59717
patrick.secor@montana.edu
https://www.montana.edu/mbi/directory/2553333/patrick-secor

ACADEMIC APPOINTMENTS

2024 – present Montana State University
Associate Professor
Department of Microbiology & Cell Biology

2023 – 2024 University of Montana
Associate Professor
Division of Biological Sciences
CMMB Graduate Program
Center for Translational Medicine

2017- 2023 University of Montana
Assistant Professor
Division of Biological Sciences
CMMB Graduate Program
Center for Translational Medicine

2013-2017 University of Washington
Cystic Fibrosis Foundation Postdoctoral Fellow
Advisor: Pradeep K. Singh

2011-2013 University of Washington
NIH T32 Postdoctoral Fellow
Advisor: William C. Parks

EDUCATION

2006-2011 Montana State University
Center for Biofilm Engineering
Ph.D. in Biological Sciences/Microbiology
Advisor: Garth A. James

2002-2006 Montana State University
B.S. in Biochemistry, *cum laude*

PEER REVIEWED PUBLICATIONS

https://scholar.google.com/citations?user=LpTGTwwAAAAJ&hl=en&oi=ao

**Graduate student co-author, **Undergraduate co-author, ***Postdoc co-author*
[#]P. R. Secor listed as corresponding author

2026 *(43)* Pershing, N, Brzozowski RS, Schmidt AK, Pershing NL, Dankwardt A, Faith DR, Joyce AC, Lizett Ortiz de Ora, John D Kominsky, Annika Dankwardt, Andrew Maciver, Rickesha Bell, William S Henriques, Shelby E Andersen, Blake Wiedenheft, Sherwood R Casjens, Breck A Duerkop, June L Round, Patrick R Secor. A prophage-encoded sRNA limits lytic phage infection of adherent-invasive *E. coli*. ***PLoS Pathog***. 2026 Jan 2;22(1):e1013836. doi: 10.1371/journal.ppat.1013836. PMID: 41481766.

2025

(42) Pourtois JD, Haddock NL, Gupta A, Khosravi A, Martinez HA, Schmidt AK, et al. New *Pseudomonas* infections drive Pf phage transmission in CF airways. ***JCI Insight***. 2025;10(11). Epub 20250422. doi: 10.1172/jci.insight.188146. PubMed PMID: 40261708.

(41) Fitzpatrick AD, Taylor VL, Patel PH, Faith DR, Secor PR, Maxwell KL. Phage reprogramming of Pseudomonas aeruginosa amino acid metabolism drives efficient phage replication. ***mBio***. 2025;16(3):e0246624. Epub 20250207. doi: 10.1128/mbio.02466-24. PubMed PMID: 39918338.

2024

(40) Burgener EB, Gupta A, Nakano K, Gibbs SL, Sommers ME, Khosravi A, Bach MS, Dunn C, Spano J, **Secor PR**, Tian L, Bollyky PL, Milla CE. Pf bacteriophage is associated with decline in lung function in a longitudinal cohort of patients with cystic fibrosis and *Pseudomonas* airway infection. ***J Cyst Fibros***. 2024. Epub 20241025. doi: 10.1016/j.jcf.2024.09.018. PubMed PMID: 39490215.

(39) Burgener EB, Cai P, Kratochvil MJ, Rojas-Hernandez LS, Joo NS, Gupta A, **Secor PR**, Heilshorn SC, Spakowitz AJ, Wine JJ, Bollyky PL, Milla CE. The lysogenic filamentous *Pseudomonas* bacteriophage phage Pf slows mucociliary transport. ***PNAS Nexus***. 2024:pgae390.

(38) Chen Q, Cai P, Chang THW, Burgener E, Kratochvil MJ, Gupta A, Hargil A, **Secor PR**, Nielsen JE, Barron AE, Milla C, Heilshorn SC, Spakowitz AJ, Bollyky PL. 2024. Pf bacteriophages hinder sputum antibiotic diffusion via electrostatic binding. ***Science Advances,*** 10 (22), eadl5576

(37) Schmidt AK*, Schwartzkopf CM*, Pourtois JD, Burgener E, Faith DR*, Joyce A**, Lamma T**, Kumar G, Bollyky PL, **Secor PR**[#]. 2024. Targeted deletion of Pf prophages from diverse *Pseudomonas aeruginosa* isolates impacts quorum sensing and virulence traits. ***Journal of Bacteriology***, 2024:e0040223, doi: 10.1128/jb.00402-23

(36) Copeland CJ*, Roddy JW, Schmidt AK*, **Secor PR**, Wheeler TJ. 2024. VIBES: A Workflow for Annotating and Visualizing Viral Sequences Integrated into Bacterial Genomes. ***NAR Genomics and Bioinformatics,*** 6 (2), doi.org/10.1093/nargab/lqae030

(35) Faith DR*, Kinnersley M, Brooks DM, Drecktrah D, Hall LS, Luo E, Santiago-Frangos A, Wachter J, Samuels DS, **Secor PR**[#]. 2024. Characterization and genomic analysis of the Lyme disease spirochete bacteriophage ϕBB-1. ***PLoS Pathogens,*** 2024;20(4):e1012122. doi: 10.1371/journal.ppat.1012122

(34) Román-Cruz VC*, Miller SM, Schoener RA, Lukasiewicz C, Schmidt AK*, DeBuysscher BL, Burkhart D, **Secor PR**, Evans JT. 2024. Adjuvanted Vaccine Induces Functional Antibodies against *Pseudomonas aeruginosa* Filamentous Bacteriophages. ***Vaccines*** 12:115

(33) Schwartzkopf, C.M.*, Taylor, V., Groleau, M-C., Faith, D. R.*, Schmidt, A. K.*, Lamma, T.**, Brooks, D. M., Déziel, E., Maxwell, K., and **Secor, P. R.**[#]. Inhibition of PQS signaling by the Pf bacteriophage protein PfsE enhances viral replication in *Pseudomonas aeruginosa.* ***Molecular Microbiology.*** 2024; doi:10.1111/mmi.15202

2023

(32) de Mattos CD*, Faith DR*, Nemudryi AA, Schmidt AK*, Bublitz DC, Hammond L, Kinnersley MA, Schwartzkopf CM*, Robinson AJ**, Joyce A**, Michaels LA, Brzozowski RS, Coluccio A, Xing DD, Uchiyama J, Jennings LK, Eswara P, Wiedenheft B, **Secor PR**[#]. Polyamines and linear DNA mediate bacterial threat assessment of bacteriophage infection. ***Proc Natl Acad Sci U S A***. 2023;120(9):e2216430120. doi: 10.1073/pnas.2216430120

(31) Schwartzkopf CM*, Robinson AJ**, Ellenbecker M, Faith DR*, Schmidt AK*, Brooks DM, Lewerke L*, Voronina E, Dandekar AA, **Secor P. R.**[#] Tripartite interactions between filamentous Pf4 bacteriophage, *Pseudomonas aeruginosa*, and bacterivorous nematodes. ***PLoS Pathog***. 2023;19(2):e1010925. doi: 0.1371/journal.ppat.1010925

(30) Sapiro AL, Hayes BM, Volk RF, Zhang JY, Brooks DM, Martyn C, Radkov A, Zhao Z, Kinnersley M, **Secor P. R.**, Zaro BW, Chou S. Longitudinal map of transcriptome changes in the Lyme pathogen *Borrelia burgdorferi* during tick-borne transmission. ***eLife***. 2023 https://doi.org/10.7554/eLife.86636.1

(29) Wachter, J., Cheff, B., Hillman, C., Carracoi, V., Dorward, D.W., Martens, C., Barbian, K., Nardone, G., Olano, R.L., Kinnersley, M, **Secor, P.R**., and Rosa, P.A. Coupled induction of prophage and virulence factors during tick transmission of the Lyme disease spirochete. ***Nature Communications***, 2023 https://doi.org/10.1038/s41467-023-35897-3

(28) M. T. van Rossem, S. Wilks, **P. R. Secor**, M. Kaczmarek, G. D'Alessandro. Homogenization modelling of antibiotic diffusion and adsorption in viral liquid crystals. ***Royal Society Open Sci***, Vol 10, Issue 1, Jan. 2023, doi.org/10.1098/rsos.221120

2022

(27) M. S. Bach, C. R. de Vries, A. Khosravi, J. M. Sweere, M. C. Popescu, Q. Chen, S. Demirdjian, A. Hargil, J. D.Van Belleghem, G. Kaber, M. Hajfathalian, E. B. Burgener, D. Liu, Q. Tran, T. Dharmaraj, M. Birukova, V. Sunkari, S. Balaji, N. Ghosh, S. S. Steiner, M. S. El Masry, S. G. Keswani, N. Banaei, L. Nedelec, C. K. Sen, V. Chandra, **P. R. Secor**, G. A. Suh, P. L. Bollyky. Filamentous bacteriophage delays healing of *Pseudomonas*-infected wounds. ***Cell Reports Medicine***, Vol 3, Issue 6, June 2022, https://doi.org/10.1016/j.xcrm.2022.100656

(26) **Secor, P. R**.[#], Michaels, L. A., Bublitz, D.C., Jennings, L.K., Singh, P.K. (2022). The Depletion Mechanism Actuates Bacterial Aggregation by Exopolysaccharides and Determines Species Distribution & Composition in Bacterial Aggregates. ***Front. Cell. Infect. Microbiol***. https://doi.org/10.3389/fcimb.2022.869736

(25) Faith, D*., Kinnersley, M., Schwartzkopf, C.M*., de Mattos, C.D*., Schmidt, A.K*., and **Secor, P.R**[#]. (2022). Complete Genome Sequence of the N4-like *Pseudomonas aeruginosa* Bacteriophage vB_PaeP_CMS1. ***Microbiol Resour Announc***, e0023922. 10.1128/mra.00239-22

(24) van Rossem, M., Wilks, S., Kaczmarek, M., **Secor, P.R.**, and D'Alessandro, G. (2022). Modelling of filamentous phage-induced antibiotic tolerance of *P. aeruginosa*. ***PLoS One*** 17, e0261482. 10.1371/journal.pone.0261482.

(23) A.K. Schmidt*, A.D. Fitzpatrick, C. S. Schwartzkopf*, D.R. Faith*, L.K. Jennings, A. Coluccio, D.J. Hunt**, L.A. Michaels, D.W. Dorward, J. Wachter, P.A. Rosa, K.L. Maxwell, **P.R. Secor**[#]. A Filamentous Bacteriophage Protein Inhibits Type IV Pili to Prevent Superinfection of *Pseudomonas aeruginosa.* ***mBio***, 2022; https://doi.org/10.1128/mbio.02441-21

2021

(22) Kirsch JM, Brzozowski RS***, Faith D.R.*, Round JL, **Secor PR**, Duerkop BA. Bacteriophage-Bacteria Interactions in the Gut: From Invertebrates to Mammals. ***Annu Rev Virol.*** 2021;8(1):95-113. doi:10.1146/annurev-virology-091919-101238.

(21) Jennings LK, Dreifus JE, Reichhardt C, Storek KM, **Secor PR**, Wozniak DJ, Hisert KB, Parsek MR. *Pseudomonas aeruginosa* aggregates in cystic fibrosis sputum produce exopolysaccharides that likely impede current therapies. ***Cell Rep***. 2021;34(8):108782. doi: 10.1016/j.celrep.2021.108782

2020

(20) E. B. Burgener, **P. R. Secor,** M. C. Tracy, J. M. Sweere, E. M. Bik, C. E. Milla, and P. L. Bollyky. Methods for Extraction and Detection of Pf Bacteriophage DNA from the Sputum of Patients with Cystic Fibrosis, ***Phage: Therapy, Applications, and Research*****,** June 2020, doi.org/10.1089/phage.2020.0003

(19) **P. R. Secor**[#] and A. A. Dandekar, More than Simple Parasites: The Sociobiology of Bacteriophages and Their Bacterial Hosts. ***mBio***, March 10, 2020, https://mbio.asm.org/content/11/2/e00041-20

(18) **P. R. Secor**, E B Burgener, M Kinnersley, L K Jennings, V Roman-Cruz*, M Popescu, J D Van Belleghem, N Haddock, C Copeland**, L A Michaels, C R De Vries, Q Chen, J Pourtois, T J Wheeler, C E Milla, P L Bollyky. Pf Bacteriophage and Their Impact on *Pseudomonas* Virulence, Mammalian Immunity, and Chronic infections. ***Front. Immunol.***, 21 February 2020 doi.org/10.3389/fimmu.2020.00244

2019

(17) J M. Sweere, H Ishak, V Sunkari, M S. Bach, R Manasherob, K Yadava, S. M. Ruppert, C. K. Sen, S Balaji, S. G. Keswani, **P. R. Secor**, and Paul L. Bollyky. (2019) The Immune Response to Chronic *Pseudomonas aeruginosa* Wound Infection in Immunocompetent Mice. ***Advances in Wound Care***, Vol. 8

(16) E. B. Burgener, J. M. Sweere, M. S. Bach, **P. R. Secor**, N Haddock, L. K. Jennings, R. L. Marvig, H. K. Johansen, E. Rossi, X. Cao, L. Tian, L. Nedelec, S. Molin, P. L. Bollyky, and C. E. Milla. (2019) Filamentous bacteriophages are associated with chronic *Pseudomonas* lung infections and antibiotic resistance in cystic fibrosis. ***Science Translational Medicine***, Vol. 11, Issue 488, eaau9748

(15) J. M. Sweere, H. Ishak, M. S. Bach, V. Sunkari, G. Kaber, R. Manasherob, G. A. Suh, M. Popescu, P. L. Marshall, M. Birukova, E. Katznelson, D. V. Lazzareschi, S. Balaji, S. Keswani, T. R. Hawn, **P. R. Secor**, and P. L. Bollyky. (2019) Filamentous Bacteriophage Suppress Clearance of Bacterial Infection. ***Science***, Vol. 363, Issue 6434, eaat9691

2018

(14) **P. R. Secor**[#]**,** M., L.A., Ratjen, A., Jennings, L.K., Singh, P.K. Entropically-driven aggregation of bacteria by host polymers promotes antibiotic tolerance in *Pseudomonas aeruginosa*. ***PNAS****,* Oct 2018, 201806005; DOI:10.1073/pnas.1806005115

2017

(13) Jorth, P.A., McLean, K., Ratjen, A., **Secor, P.R.,** Bautista, G.E., Ravishankar, S., Rezayat, A., Garudathri, J., Harrison, J.J., Harwood, R.A., Penewit, K., Waalkes, A., Singh, P.K., Salipante, S.J. (2017) Evolved aztreonam resistance is multifactorial and can produce hypervirulence in *Pseudomonas aeruginosa.* ***mBio***, 8:e00517-17

(12) Nazik, H., Joubert, L.M., **Secor, P.R.,** Sweere, J.M., Bollyky, P.L., Sass, G., Cegelski, L., Stevens, D.A. (2017) *Pseudomonas* Phage Inhibition of *Candida albicans.* ***Microbiology***, 163 (11), 1568-1577

(11) **Secor P.R.**[#]**,** Sass G, Nazik H, Stevens DA. (2017) Effect of acute predation with bacteriophage on intermicrobial aggression by *Pseudomonas aeruginosa*. ***PLoS One***. 16;12(6):e0179659. doi: 10.1371/journal.pone.0179659

(10) **Secor, P.R.**[#]**,** Michaels, L.A., Smigiel, K.S., Rohani, M.G., Jennings, L.K., Hisert, K.B., Arrigoni, A., Braun, K.R., Birkland, T.P., Hallstrand, T.S., Lai, Y., Bollyky, P.L., Singh, P.K., Parks, W.C. (2017) Filamentous bacteriophage produced by *Pseudomonas aeruginosa* alters the inflammatory response and promotes non-invasive infection *in vivo*. ***Infection and Immunity****,* vol. 85, issue 1. Featured on journal cover.

2016

(9) Penner, J.C., Ferreira, J.A.G., **Secor, P.R.,** Sweere, J.M., Birukova, M.K., Joubert, L.M., Haagensen, J.A.J., Garcia, O., Malkovskiy, A.V., Kaber, G., Nazik, H., Manasherob, R., Spormann, A.M., Clemons, K.V., Stevens, D.A., Bollyky, P.L. (2016) Pf4 Bacteriophage Produced by *Pseudomonas aeruginosa* Inhibits *Aspergillus fumigatus* Metabolism via Iron Sequestration. ***Microbiology****,* 162, 1583-1594

(8) **Secor, P.R.**[#]**,** Jennings, L.K., Michaels, L.A., Sweere, J.M., Singh, P.K., Parks, W.C., Bollyky, P.L. (2016) Biofilm assembly becomes crystal clear – filamentous bacteriophage organize the *Pseudomonas aeruginosa* biofilm matrix into a liquid crystal. ***Microbial Cell***, 3(1): 49-52. Featured on journal cover.

2015

(7) **Secor, P.R.**[#]**,** Sweere, J.M., Michaels, L.A., Malkovskiy, A.V., Lazzareschi, D., Katznelson, E., Rajadas, J., Birnbaum, M.E., Arrigoni, A., Braun, K.R., Evanko, S.P., Stevens, D.A., Kaminsky, W., Singh, P.K., Parks, W.C., Bollyky, P.L. (2015)

Filamentous Bacteriophage Promote Biofilm Assembly and Function. ***Cell Host & Microbe***, 18(5): 549-59

(6) Jennings L.K., Storek K.M., Ledvina H.E., Coulon C., Marmont L.S., Sadovskaya I., **Secor, P.R.,** Tseng B.S., Scian M., Filloux A., Wozniak D.J., Howell P.L., Parsek M.R. (2015) Pel is a cationic exopolysaccharide that cross-links extracellular DNA in the *Pseudomonas aeruginosa* biofilm matrix. ***Proc Natl Acad Sci U S A***, 112(36): 11353-8

2012 *(5)* **Secor, P. R.**[#]**,** Jennings, L. K., James, G. A., Kirker, K. R., Pulcini, E. D., McInnerney, K., Gerlach, R., Livinghouse, T., Hilmer, J. K., Bothner, B., Fleckman, P., Olerud, J. E., Stewart, P. S. (2012) Phevalin (aureusimine B) production by *Staphylococcus aureus* biofilm and impacts on human keratinocyte gene expression, ***PLoS One*** 7(7) e40973

2011 *(4)* **Secor, P. R.**[#]**,** James, G. A., Fleckman, P., Olerud, J. E., McInnerney, K., and Stewart, P.S. (2011) *Staphylococcus aureus* Biofilm and Planktonic cultures differentially impact gene expression, MAPK phosphorylation, and cytokine production in human keratinocytes. ***BMC Microbiol****,* 11:143

2009 *(3)* Kirker, K.R., **Secor, P.R.,** James, G.A, Fleckman, P., Olerud, J.E., Stewart, P.S., (2009) Loss of viability and induction of apoptosis in human keratinocytes exposed to *Staphylococcus aureus* biofilms in vitro. ***Wound Repair Regen***, 17(5): 690-9

2008 *(2)* Dowd, S.E., Sun, Y., **Secor, P.R**., Rhoads, D.D., Wolcott, B.M., James, G.A., Wolcott, R.D. (2008) Survey of bacterial diversity in chronic wounds using pyrosequencing, DGGE, and full ribosome shotgun sequencing. ***BMC Microbiol***, 8: 43

(1) James, G.A., Swogger, E., Wolcott, R., Pulcini, E., **Secor, P.R.,** Sestrich, J., Costerton, J.W., Stewart, P.S. (2008) Biofilms in chronic wounds. ***Wound Repair Regen***, 16(1): 37-44. Cited ~ 2,000 times.

INVITED PREVIEWS / COMMENTARIES / EDITORIALS

2023 Schmidt, A.K.*, Faith, D.R.*, and **Secor, P.R**[#]. PICI Thieves: Molecular Piracy and Cooperation. ***Cell Host & Microbe***, 31(1), January 2023.

2019 Bollyky, P.L. and **Secor, P.R**[#]**.** (2019) The Innate Sense of Bacteriophages. ***Cell Host & Microbe***, 25(2).

PREPRINTS

2025 Brzozowski RS, Schmidt AK, Pershing NL, Dankwardt A, Faith DR, Joyce AC, et al. A prophage-encoded sRNA limits lytic phage infection of adherent-invasive *E. coli*. ***bioRxiv***. 2025. Epub 20250506. doi: 10.1101/2025.05.06.652453. PubMed PMID: 40654919.

2024 Chen Q, Cai P, Chang THW, Burgener E, Kratochvil MJ, Gupta A, Hargil A, **Secor PR**, Nielsen JE, Barron AE, Milla C, Heilshorn SC, Spakowitz AJ, Bollyky PL. 2024. Pf bacteriophages hinder sputum antibiotic diffusion via electrostatic binding. ***bioRxiv*** doi:10.1101/2024.03.10.584330:2024.03.10.584330. In press at *Science Advances*.

Faith DR*, Kinnersley M, Brooks DM, Drecktrah D, Hall LS, Luo E, Santiago-Frangos A, Wachter J, Samuels DS, **Secor PR**[#]. 2024. Characterization and genomic analysis of the Lyme disease spirochete bacteriophage ϕBB-1. ***bioRxiv*** doi:10.1101/2024.01.08.574763:2024.01.08.574763. In press at *PLoS Pathogens*.

2023 Schmidt AK*, Schwartzkopf CM*, Pourtois JD, Burgener E, Faith DR*, Joyce A**, Lamma T**, Kumar G, Bollyky PL, **Secor PR**[#]. 2023. Targeted deletion of Pf prophages from diverse *Pseudomonas aeruginosa* isolates impacts quorum sensing and virulence traits. ***bioRxiv*** doi:10.1101/2023.11.19.567716:2023.11.19.567716. In press at *Journal of Bacteriology*.

2022 Sapiro AL, Hayes BM, Volk RF, Zhang JY, Brooks DM, Martyn C, Radkov A, Zhao Z, Kinnersley M, **Secor PR**, Zaro BW, Chou S. Longitudinal map of transcriptome changes in the Lyme pathogen *Borrelia burgdorferi* during tick-borne transmission. ***bioRxiv***. 2023:2022.11.09.515847. doi: 10.1101/2022.11.09.515847. In press at *eLife*.

Schwartzkopf CM, Robinson AJ, Ellenbecker M, Faith DR, Brooks DM, Lewerke L, Voronina E, Dandekar AA, **Secor PR**. Tripartite interactions between filamentous Pf4 bacteriophage, *Pseudomonas aeruginosa*, and bacterivorous nematodes. ***bioRxiv***. 2022:2022.10.11.511824. doi: 10.1101/2022.10.11.511824. In press at *PLoS Pathogens*.

C. D. de Mattos*, A. A. Nemudryi, D. Faith*, D. C. Bublitz, L. Hammond, M. A. Kinnersley, C. M. Schwartzkopf*, A. J. Robinson**, A. Joyce**, L. A. Michaels, R. S. Brzozowski***, A. Coluccio, D. D. Xing, J. Uchiyama, L. K. Jennings, P. Eswara, B. Wiedenheft, **P. R. Secor**. Bacterial threat assessment of bacteriophage infection is mediated by intracellular polyamine accumulation and Gac/Rsm signaling. ***bioRxiv***. 2022, https://doi.org/10.1101/2022.04.01.486733. In press at *PNAS*.

2021 **Secor, P. R.**[#], Michaels, LA, Bublitz, DC, Jennings, LK, Singh, PK. The depletion mechanism can actuate bacterial aggregation by self-produced exopolysaccharides and determine species distribution and composition in bacterial aggregates. ***bioRxiv***. 2021, doi.org/10.1101/2021.05.11.443568

2020 Bach MS, Vries CRd, Sweere JM, Popescu M, Belleghem JDV, Kaber G, Burgener EB, Liu D, Tran Q-L, Dharmaraj T, Birukova M, Sunkari V, Balaji S, Keswani S, Banaei N, Khona DK, Nedelec L, Sen CK, Chandra V, **Secor P. R.**, Suh GA, Bollyky PL. Filamentous Bacteriophage Delay Healing of *Pseudomonas*-Infected Wounds. ***bioRxiv***. 2020, doi.org/10.1101/2020.03.10.985663

FUNDING AWARDED

2025 – 2027 NIH/NIAID Administrative Supplement to contract HHSN272201800048C (PI: Evans, JT, **Co-I Secor, PR**), Adjuvanted Lyme disease vaccine. $400,000 direct.

2025 – 2028 Office of Naval Research Long Range Broad Agency Announcement for Navy and Marine Corps Science & Technology (PI: Serban, M, **Co-I, Secor, PR**), Engineered Systems for Burn Research, $645,000 direct.

2024 – 2029 NIH/NIAID **R01** AI173045 (**PI, Secor, PR**), Phage-mediated horizontal gene transfer in *Borrelia burgdorferi*. $3,555,141 total

2023 – 2024 University of Montana Center for Translational Medicine Pilot Grant (**PI, Secor, PR**), Bacteriophage lysins as novel Lyme disease therapeutics. $100k direct.

2022 – 2024 NIH/NIAID Administrative Supplement to contract HHSN272201800048C (PI: Evans, JT, **Co-I Secor, PR**), Adjuvanted Lyme disease vaccine. $1M direct

2022 – 2023 NIH/INBRE Faculty Research Grant (**PI Secor, PR**)
Defining the immunogenicity of tick saliva in mice and men. $50k direct.

2022 – 2023 NIH/NIGMS COBRE **P30** GM140963 (PI: Bowler, B, **Subaward PI: Secor, PR**), Pilot Award, Structural variation of small phage proteins. $35k direct

2020 – 2025 NIH/NIDDK **R01** DK124317 (PI: Round, J.L., **Co-I Secor, PR**), Bacteriophage pathobiology of inflammatory bowel disease. $2,539,200 total

2020 – 2022 NIH/NIAID **R21** AI151597 (**PI: Secor, PR**), Targeting a ubiquitous spirochete bacteriophage to prevent Lyme disease. $275k direct

2018 – 2025 NIH/NIAID **R01** AI138981 (**PI: Secor, PR**), Immunization against filamentous bacteriophages to prevent bacterial infection. $5,618,222 total (currently on no cost extension)

2018 University of Montana Genomics Core–Illumina Mini-Grant (**PI, Secor, P.R.**). $5k direct

2017 – 2021	NIH/NIGMS COBRE **P30** GM140963 (PI: Sprang, S, **Subaward PI: Secor, PR**) Young Investigator Award. $300k direct
2017 – 2020	NIH/NIAID Career Transition Award **K22** AI125282 (**PI: Secor, PR**) Understanding polymer-induced bacterial aggregation and antimicrobial tolerance. $250k direct
2017 – 2019	Dr. Ralph and Marian Falk Medical Research Trust – Catalyst Award (PI Bollyky, P.L., **Co-I Secor, P.R.**). $1M direct
2016	The Charlie Moore Endowed Fellowship for Cystic Fibrosis Research, (**PI, Secor, P.R.**), $10,000 direct.
2015 – 2017	Cystic Fibrosis Foundation (National) Postdoctoral Fellowship
2013 – 2014	Cystic Fibrosis Foundation Fellowship, Seattle Chapter, Postdoctoral Fellowship
2013	Stanford University Immunology Postdoctoral Training Grant, awarded, but declined 5**T32** AI007290-29 (NIH/NIAID)
2011	University of Washington Pulmonary Postdoctoral Training Grant 5**T32** HL007287-33 (NIH/NHLBI)

GRANTS PENDING REVIEW / RESUBMISSION

NIH/**Office of the Director Transformative Research Award** R01OD042048 (**PI, Secor, PR**), Phage-Immunity Crosstalk in Intestinal Homeostasis. 2026 – 2031. Pending review April 2026. $8.4M total cost over 5 years.

HHS-NIH-NIAID-BAA2025-1 **NIH Contract** (**MPI, Secor, PR**), Clinical Development of a Multivalent (PaV-T4) Vaccine Targeting *Pseudomonas aeruginosa* ESKAPE Pathogen. Reviewed, pending Administrative Evaluation. $18.59M total funds over 5 years.

NIH/NIAID **R01** AI200153 (PI: **Secor, PR**), The Role of Inoviruses in Bacterial Immunity. $3.78M total cost over 5 years.

NIH/NIAID **R21** AI199233**,** (**PI: Secor, PR**), Phollowing and harnessing phage outbreaks in the tick microbiome for vector and pathogen control. $398,750 total cost over 2 years.

NIH/NIAID **R21** AI199232**,** (**PI: Secor, PR**), Phage-Induced Biofilm Dispersal and Transmission Dynamics in *Leptospira*. $398,750 total cost over 2 years.

AWARDS & RECOGNITION

2025	Standing member, NIH Bacterial Host Interactions (BHI) Study Section
2025	Press coverage of NIH R01 Lyme disease award: Mountain Journal, Bozeman Daily Chronicle, Montana State University News
2023	Blavatnik Award Nominee, Biological Sciences, University of Montana
2021	Faculty Merit Award for outstanding research productivity, University of Montana
2020	Faculty Merit Award for outstanding research productivity, University of Montana
2020	Co-moderator, Life at the Cutting Edge, ASMicrobe, Chicago, IL (canceled, COVID-19)
2018	Searle Scholar Nominee, University of Montana
2018	Young Investigator Award, Center for Biofilm Engineering, Montana State University
2017	Young Investigator Award, Center for Biomolecular Structure and Design, University of Montana
2016	NIH/NIAID Career Transition Award (K22)
2016	The Charlie Moore Endowed Fellowship for Cystic Fibrosis Research
2015-2017	Cystic Fibrosis Foundation (National) Postdoctoral Fellowship
2013-2014	Cystic Fibrosis Foundation Postdoctoral Fellowship, Seattle Chapter

2012-2013	NIH T32 Postdoctoral Fellow
2009	W.G. Characklis Scholarship for Outstanding Ph.D. Student

INTELLECTUAL PROPERTY

2021	PCT/US2020/063086; Antibacterial Carbohydrate Vaccine.
2020	US Patent App. 63/078,777; Compositions and Methods Targeting Filamentous Bacteriophage. **Licensed to Inimmune Corp**.
2019	US Patent 10,835,607 - Monoclonal antibody and vaccine targeting filamentous bacteriophage. **Licensed to Inimmune Corp**.

TEACHING

Spring 2026	Instructor, Microbiology Seminar BIOM 494, Montana State University
Fall 2025	Instructor, Microbial Physiology BIOM 450/520, Montana State University
Spring 2025	Instructor, Microbiology Seminar BIOM 494, Montana State University
Fall 2018-2024	Instructor, Microbial Physiology (plus lab) BIOM 450/451, University of Montana
Spring 2020	Co-instructor, The Diversity of Life BIOB 170, University of Montana
Summer 2018	HHMI Summer Institute on Scientific Teaching
Spring 2010	Co-instructor, Microbes in the Environment, Montana State University
2007-2008	Teaching Assistant, Molecules to Cells, Montana State University

MENTORING

Graduate students	Camilla de Mattos, PhD, graduated Jan. 2023 Caleb Schwartzkopf, PhD, graduated June 2023 Valery Roman-Cruz, co-advised with Dr. Jay Evans, graduated August 2023 Amelia Schmidt, PhD candidate, ***2022 NSF GRFP honorable mention*** Dominick Faith, PhD student, MCB Program, Montana State University ***2023 NSF GRFP recipient*** Alex Joyce, PhD student, 2024 MCB Program, Montana State University Albert Burle, PhD student, 2025 MCB Program, Montana State University
Graduate Committees	Montana State: Dominick Faith, Alex Joyce, Matt Abbott, Shishir Pandey University of Montana: Camilla de Mattos, Caleb Schwartzkopf, Valery Romon-Cruz, Amelia Schmidt, Conner Copeland, Shaun Wachter, Kelley Van Vaerenberghe, Christopher Pierpont, John Statz, Ian Bailey,
External/International Graduate Committees	Nanami Kubota (University of Pittsburgh, Advisor Vaughn Cooper), Natisha Menton (Amrita University, India, advisor Geetha Kumar), Marion Bichet (Monash University, Australia, advisor Jeremy Barr)
Postdocs	Dr. Robert Brzozowski (2020-2024), Dr. Liz Ortiz de Ora (2025-present)
Research Faculty	Dr. Margie Kinnersley Dr. DeAnna Bublitz Dr. Reetika Chaurasia Dr. Liz Ortiz de Ora

INVITED SEMINARS, CONFERENCES, & SYMPOSIUMS

2025	- **Conference on Bacteriophages: Biology, Dynamics, and Therapeutics**, International Antiviral society, Washington DC, Oct 2025 -Montana Biofilm Meeting, **Montana State University**, July 2025

2024	-Center for Biofilm Engineering Seminar Series, **Montana State University**, Nov 2024. -Department of Microbiology and Immunology Seminar Series, **Montana State University**, Oct 2024. -**Bacterial Cell Surfaces GRC**, invited speaker, University of Southern Maine, June 23-28, 2024. -Department of Microbiology and Immunology, **University of Minnesota**, Minneapolis, MN, Feb. 2024. -Departmental Seminar, Department of Microbial Infection and Immunity, College of Medicine, Ohio State University. March 2024. -Biological Sciences seminar series, **UNC Charlotte**, Charlotte, NC, Jan. 2024. -**Biology of Spirochetes GRC**, invited speaker, Ventura, CA, Jan. 2024.
2023	-Program in Microbiology and Immunology Seminar Series, **University of Pittsburgh**, School of Medicine, October 2023. *Student invited speaker -Department of Microbiology and Immunology Seminar Series, **Montana State University**, April 2023. -Research Seminar, NIH Division of Intramural Research, **NIAID Rocky Mountain Laboratories**, Hamilton, MT, Feb. 2023
2022	-Departmental Seminar, Department of Plant and Microbial Biology at **UC Berkeley**, Nov 2022 -ALARM International Symposium, **Amrita School of Biotechnology**, India, Nov. 2022 -Thinking like a microbe: a tribute to Stanley Falkow symposium, NIH Division of Intramural Research, **NIAID Rocky Mountain Laboratories**, Hamilton, MT, July 2022 -18th **International Conference on *Pseudomonas***, Atlanta, Georgia
2021	-Center for Biomolecular Structure and Dynamics Research Symposium, **University of Montana**
2020	-**University of Denver Anschutz** Microbiology Seminar Series -**American Society for Microbiology** 2020 Microbe Meeting, Co-moderator, in-depth symposium Life at the Cutting Edge *cancelled, covid -***Pseudomonas* Seminar Series**, online seminar series organized by Urvish Trivedi (University of Copenhagen) and Cassandra Nelson (University of Maryland).
2019	-**NIAID Rocky Mountain Laboratories** Summer Research Symposium, Hamilton, MT -**University of Utah** Department of Pathology Seminar Series, University of Utah -Division of Biological Sciences Seminar Series, **University of California, San Diego** -Department of Microbiology and Immunology Seminar Series, **Montana State University** -Integrative Microbiology Seminar Series, **University of California, San Francisco** -Center for Biomolecular Structure and Dynamics Research Symposium, **University of Montana** -Institute for Infection, Immunology, and Inflammation Seminar Series, **Vanderbilt University**
2018	-Center for Biomolecular Structure and Dynamics Research Symposium, **University of Montana** -Organismal Biology, Ecology, and Evolution Brewery Chalk Talk Series, **University of Montana** -Montana Biofilm Meeting, Center for Biofilm Engineering, **Montana State University**
2017	-Harkins High School Science Fusion Lecture, **University of Montana**
2016	-Pacific Northwest Epithelial Biology Meeting, **University of Washington** -Cystic Fibrosis Foundation Retreat, **University of Washington**
2015	-**North American Cystic Fibrosis Conference**, Phoenix, AZ
2014	-**North American Cystic Fibrosis Conference**, Atlanta, GA
2012	-**Cystic Fibrosis Foundation** Retreat, University of Washington
2008	-Invited Speaker, **Molecular Probes**, **Invitrogen**, Eugene, OR
2006-2010	-Montana Biofilm Meeting, Center for Biofilm Engineering, **Montana State University**

PROFESSIONAL ACTIVITIES

Editorial work

PLoS Pathogens, Feb. 2024 to present
mBio, Oct 2025 to present
FEMS Microbiology, Dec 2025 - present

Referee for Professional Publications

Cell Host & Microbe, Cell Reports, iScience, Science Advances, eLife, EMBO Journal, Virulence, Nature Biofilms and Microbiomes, Frontiers in Microbiology, Genome Evolution, Virus Evolution, mBio, Journal of Bacteriology, Applied and Environmental Microbiology, mSphere, Journal of Virology, Soft Matter, PLoS ONE, Spectrum, Viruses, PLoS Biology, PLoS Pathogens, Nature Communications.

Grant review

2025 Standing member, NIH BHI Study Section
2025 *ad hoc* member, NIH IMII Study Section
2025 *ad hoc* member, NIH ODCS study section
2024 *ad hoc* member, NIH BHI Study Section
2023 *ad hoc* member, NIH NIAID F31 Study Section
2022 *ad hoc* member, NIH NIAID P01 Study Section
2021 *ad hoc* member, NIH DDR Study Section
2021 *ad hoc* reviewer, Cystic Fibrosis Foundation
2020 *ad hoc* member, NIH Special Emphasis Study Section

Professional Society Affiliations

American Society for Microbiology

Departmental Service

Chair: Environmental Microbiology Faculty Search (2025)
Member: Graduate Admissions Committee, Montana State University (2024- present)
Member: Graduate Admissions Committee, University of Montana (2017- 2024, *Chair* 2022-2024)
Member: Neuroscience Faculty Search Committee, University of Montana (2019)
Member: Microbiology Curriculum Advisory Committee, University of Montana (2022-2024)
Member: DBS Curriculum Committee, University of Montana (2022-2024)
Member: Center for Translational Medicine Faculty Advisory Council, University of Montana (2019-2024)

College Service

Undergraduate Award and Scholarship Committee, University of Montana (2019)

University Service

Faculty senate: MCB representative (2025 – present)
Institutional Biosafety Committee, University of Montana (2021-2024)

State Service

Appointed Member, Rare Disease Advisory Board, State of Montana, 2026-present

OUTREACH

2018-2020	My lab has hosted numerous high school students through the local Advanced Problems in Science Program. High school students work on a research project for an entire semester and then share their findings with their peers back at their high schools and at a poster session at the University of Montana.
2018 & 2019	My lab hosted multiple scientific outreach activities with the Ray Bjork Learning Center's PEAK Program for gifted and talented elementary-aged children.
2017	Harkins High School Science Fusion Lecture, University of Montana

2009-2011	Instructor, American Indian Research Opportunities (AIRO) educational outreach program for Native American students interested in STEM-based careers, Montana State University