**Julia M. Brown, PhD**
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## Research Interests

Julia is a Research Scientist at Bigelow Laboratory for Ocean Sciences with a background in microbiology, virology and bioinformatics. Julia's research aims to characterize the diversity and roles of marine viruses and microbes in order to better understand their activity and potential within climate relevant ecosystems. Her research utilizes integrated field-based sampling approaches coupled with state-of-the-art nucleic acid sequencing technologies and advanced bioinformatic analyses to draw out novel, otherwise unseen connections and relationships.

## Appointments

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| 2022-present | Research Scientist, Bigelow Laboratory for Ocean Sciences |
| 2020-present | Research Faculty, Colby College |
| 2020-2022 | Bioinformatics Scientist, Bigelow Laboratory for Ocean Sciences |
| 2016-2020 | Bioinformatician, Bigelow Laboratory for Ocean Sciences |
| 2015-2016 | Postdoctoral Research Fellow, Einstein College of Medicine |

## Education

2015-2016 Postdoctoral Research Fellow
Albert Einstein College of Medicine, Bronx, NY
Department of Systems and Computational Biology
**Postdoctoral advisor:** Dr. Libusha Kelly

2015 Ph.D. in Microbiology, concentrations in Genomics and Ecology
Cornell University, Ithaca, NY
**Dissertation:** *Cyanobacteria-associated bacteriophage communities over scales of spatial, temporal and environmental change*
**PhD advisor:** Dr. Ian Hewson
**Committee Members:** Dr. Daniel Buckley, Dr. Nelson Hairston

2008 B.A. Chemistry *cum laude*, conc. Biochemistry
Carleton College, Northfield, MN

## Grants, Honors and Awards

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|---|---|
| 2023 | Schmidt Ocean Institute: Linking microbes and system function across oceanic oxygen gradients through in situ approaches, Co-PI (**Ship time)** |
| 2023 | Bigelow Internal Seed Grant: Establishment of techniques for integration of 'omics and SAG data to identify phage infection strategy within OMZs, PI **($30,000)** |
| 2022 | Bigelow Internal Seed Grant: Can satellite data predict microbial metabolic potential?, Co-PI **($12,000)** |
| 2022-2024 | NSF EAGER: Microencapsulation-based genomics of individual RNA viruses, Co-I **($299,524)** |
| 2020-2022 | NSF EAGER: Encapsulation and sequencing of extracellular DNA, Co-I **($299,178)** |
| 2014 | CALS Microbiology TA of the Year **("The Golden Apple")** |
| 2010 | Small Grant, Cornell Biogeochemistry and Environmental Biocomplexity **($3450)** |

## Peer-Reviewed Manuscripts

Chang, T, Gavelis GS, **Brown JM**, Stepanauskas R. 2024. "Genomic Representativeness and Chimerism in Large Collections of SAGs and MAGs of Marine Prokaryoplankton." *Microbiome* 12 (1): 126.

Lindsay MR, D'Angelo T, Munson-McGee JH., Saidi-Mehrabad A, Delvin M, Goodell E, Herring M, Lybelczyk L, Mascena C, **Brown JM**, Gavelis GS, Liu J, Yousavich DJ, Hamilton-Brehm SD, Hedlund BP, Lang S, Treude T, Poulton NJ, Stepanausaks R, Moser DP., Emerson D, Orcutt BN. 2024 Species-resolved, single-cell respiration rates reveal dominance of sulfate reduction in a deep continental subsurface ecosystem. *Proceedings of the National Academy of Sciences of the United States of America*, 121 (15): e2309636121

Booker AE, D'Angelo T, Adams-Beyea A, **Brown JM**, Nigro O, Rappé MS, Stepanauskas R, Orcutt BN (2023) Life strategies for Aminicenantia in subseafloor oceanic crust. *The ISME Journal*, 17(9):1406–1415. https://doi.org/10.1038/s41396-023-01454-5

Kauffman KM*, Chang WK*, **Brown JM**, Hussain FA, Yang J, Polz MF, Kelly L (2022) Resolving the structure of phage–bacteria interactions in the context of natural diversity. *Nature Communications*, 13(1):1–20.

Munson-McGee JH*, Lindsay MR*, Sintes E, **Brown JM**, D'Angelo T, Brown J, Lubelczyk LC, Tomko P, Emerson D, Orcutt BN, Poulton NJ, Herndl GJ, Stepanauskas R (2022) Decoupling of respiration rates and abundance in marine prokaryoplankton. *Nature*, 612(7941):764–770. https://doi.org/10.1038/s41586-022-05505-3

Kim WE*, Charov K*, Džunková M*, Becraft ED*, **Brown J***, Schulz F, Woyke T, La Clair JJ, Stepanauskas R, Burkart MD (2021) Synthase-Selective Exploration of a Tunicate Microbiome by Activity-Guided Single-Cell Genomics. *ACS Chemical Biology*, 16(5):813–819. https://doi.org/10.1021/acschembio.1c00157

Goordial J, D'angelo T, Labonté JM, Poulton NJ, **Brown JM**, Stepanauskas R, Früh-Green G, Orcutt BN (2021) Microbial diversity and function in shallow subsurface sediment and oceanic lithosphere of the Atlantis Massif. *Mbio*, 12(4):e00490-21.

Yang JY, Fang W, Miranda-Sanchez F, **Brown JM**, Kauffman KM, Acevero CM, Bartel DP, Polz MF, Kelly L (2021) Degradation of host translational machinery drives tRNA acquisition in viruses. *Cell Systems*, 12(8):771-779.e5. https://doi.org/10.1016/j.cels.2021.05.019

**Brown JM**, Labonté JM, Brown J, Record NR, Poulton NJ, Sieracki ME, Logares R, Stepanauskas R (2020) Single cell genomics reveals viruses consumed by marine protists. *Frontiers in microbiology*, :2317.

Beam JP, Becraft ED, **Brown JM**, Schulz F, Jarett JK, Bezuidt O, Poulton NJ, Clark K, Dunfield PF, Ravin NV, Spear JR, Hedlund BP, Kormas KA, Sievert SM, Elshahed MS, Barton HA, Stott MB, Eisen JA, Moser DP, Onstott TC, Woyke T, Stepanauskas R (2020) Ancestral Absence of Electron Transport Chains in Patescibacteria and DPANN. *Frontiers in Microbiology*, 11:1848. https://doi.org/10.3389/fmicb.2020.01848

Chen ML, Becraft ED, Pachiadaki M, **Brown JM**, Jarett JK, Gasol JM, Ravin NV, Moser DP, Nunoura T, Herndl GJ, Woyke T, Stepanauskas R (2020) Hiding in Plain Sight: The Globally Distributed Bacterial Candidate Phylum PAUC34f. *Frontiers in Microbiology*, 11:376. https://doi.org/10.3389/fmicb.2020.00376

Pachiadaki MG, **Brown JM**, Brown J, Bezuidt O, Berube PM, Biller SJ, Poulton NJ, Burkart MD, La Clair JJ, Chisholm SW (2019) Charting the complexity of the marine microbiome through single-cell genomics. *Cell*, 179(7):1623–1635.

Kauffman KM, Hussain FA, Yang J, Arevalo P, **Brown JM**, Chang WK, VanInsberghe D, Elsherbini J, Sharma RS, Cutler MB, Kelly L, Polz MF (2018) A major lineage of non-tailed dsDNA viruses as unrecognized killers of marine bacteria. *Nature*, http://dx.doi.org/10.1038/nature25474

Kauffman KM*, **Brown JM***, Sharma RS, VanInsberghe D, Elsherbini J, Polz M, Kelly L (2018) Viruses of the Nahant Collection, characterization of 251 marine Vibrionaceae viruses. *Scientific data*, 5(1):1–11.

Becraft ED, Woyke T, Jarett J, Ivanova N, Godoy-Vitorino F, Poulton N, **Brown JM**, Brown J, Lau MCY, Onstott T, Eisen JA, Moser D, Stepanauskas R (2017) Rokubacteria: Genomic Giants among the Uncultured Bacterial Phyla. *Frontiers in Microbiology*, 8:2264. https://doi.org/10.3389/fmicb.2017.02264

Pachiadaki MG, Sintes E, Bergauer K, **Brown JM**, Record NR, Swan BK, Mathyer ME, Hallam SJ, Lopez-Garcia P, Takaki Y, Nunoura T, Woyke T, Herndl GJ, Stepanauskas R (2017) Major role of nitrite-oxidizing bacteria in dark ocean carbon fixation. *Science*, 358(6366):1046–1051. https://doi.org/10.1126/science.aan8260

Stepanauskas R, Fergusson EA, Brown J, Poulton NJ, Tupper B, Labonté JM, Becraft ED, **Brown JM**, Pachiadaki MG, Povilaitis T, Thompson BP, Mascena CJ, Bellows WK, Lubys A (2017) Improved genome recovery and integrated cell-size analyses of individual uncultured microbial cells and viral particles. *Nature Communications*, 8(1):84. https://doi.org/10.1038/s41467-017-00128-z

Durham BP, Grote J, Whittaker KA, Bender SJ, Luo H, Grim SL, **Brown JM**, Casey JR, Dron A, Florez-Leiva L, Krupke A, Luria CM, Mine AH, Nigro OD, Pather S,

Talarmin A, Wear EK, Weber TS, Wilson JM, Church MJ, DeLong EF, Karl DM, Steward GF, Eppley JM, Kyrpides NC, Schuster S, Rappé MS (2014) Draft genome sequence of marine alphaproteobacterial strain HIMB11, the first cultivated representative of a unique lineage within the Roseobacter clade possessing an unusually small genome. *Standards in Genomic Sciences*, 9(3):632–645. https://doi.org/10.4056/sigs.4998989

**Brown JM**, LaBarre BA, Hewson I (2013) Characterization of Trichodesmium-associated viral communities in the eastern Gulf of Mexico. *FEMS microbiology ecology*, 84(3):603–613.

Bell RC, Belmaker A, Couch CS, Marchetto KM, Simonis JL, Thomas RQ, Sparks JP, **Brown JM**, Francisco KS, Manuel ME (2013) Effectiveness of Erythrina gall wasp biocontrol and implications for the recovery of threatened Wiliwili trees (Fabaceae: Erythrina sandwicensis) [1]. *The Journal of the Torrey Botanical Society*, 140(2):215–224. https://doi.org/10.3159/TORREY-D-12-00069.1

**Brown J**, Felice N, Scalfone N, Hewson I (2012) Influence of habitat confluence on aquatic microbial assemblages in experimental mesocosms. *Aquatic Microbial Ecology*, 66(1):33–40. https://doi.org/10.3354/ame01550

Hewson I, **Brown JM**, Burge CA, Couch CS, LaBarre BA, Mouchka ME, Naito M, Harvell CD (2012) Description of viral assemblages associated with the Gorgonia ventalina holobiont. *Coral Reefs*, 31(2):487–491. https://doi.org/10.1007/s00338-011-0864-x

Hewson I, Barbosa JG, **Brown JM**, Donelan RP, Eaglesham JB, Eggleston EM, LaBarre BA (2012) Temporal Dynamics and Decay of Putatively Allochthonous and Autochthonous Viral Genotypes in Contrasting Freshwater Lakes. *Applied and Environmental Microbiology*, 78(18):6583–6591. https://doi.org/10.1128/AEM.01705-12

Hewson I, **Brown JM**, Gitlin SA, Doud DF (2011) Nucleopolyhedrovirus Detection and Distribution in Terrestrial, Freshwater, and Marine Habitats of Appledore Island, Gulf of Maine. *Microbial Ecology*, 62(1):48–57. https://doi.org/10.1007/s00248-011-9856-1

**Brown J**, Hewson I (2010) Ecophysiology of a common unannotated gene transcript in surface water microbial assemblages of the oligotrophic open ocean. *Aquatic Microbial Ecology*, 60(3):289–297. https://doi.org/10.3354/ame01426

* Authors contributed equally to manuscript.

## Manuscripts In Review and In Preparation

### In Review

Lindsay MR, D'Angelo T, Goodell E, Munson-McGee JH, Herring M, Budner M, **Brown JM**, Gavelis G, Mascena C, Lubelczyk LC, Poulton NJ, Stepanauskas R, Orcutt BN, Emerson D (*in review*) Laminarin stimulates single cell rates of sulfate reduction while oxygen inhibits transcriptomic activity in coastal marine sediment, *ISME Journal*

**In Preparation**

**Brown JM**, Weinheimer A, Poulton N, Stepanauskas R (*in preparation*) Phage distributions within individual prokaryotes from the tropical surface ocean, *Microbiome*

Weinheimer A, Thompson B, Gavelis G, Leonaviciene G, Kiseliovas V, Mascena C, Mazutis L, Kapustina Z, Poulton NJ, **Brown JM**, Zilionis R, Stepanauskas R (*in preparation*) Genomics of environment microcompartments reveals novel genetic elements, *Nature Microbiology*

Stepanauskas R, **Brown JM**, Gavelis G, Arasti S, Mai U, Pachiadaki M, Bezuidt O, Munson-McGee JH, Biller SJ, Mirarab S (*in preparation*) Microbiome-wide rate and phylogenetic range of lateral gene transfer in marine prokaryoplankton, *Nature Microbiology*

## Mentorship

**Undergraduate:**

| | |
|---|---|
| 2024 | Josephine Pikowski, University of Southern Maine, Sea Change Semester intern |
| 2023 | Lauren Valenzuela, Northwest Missouri State University, Sea Change Semester intern |
| 2021 | Anabelle Adams-Beyea, The New School, REU intern |

**Postbaccalaureate:**

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| 2023 | Melissa Herring, Bioinformatics Intern from July – September, project github |

**Postdoctoral:**

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| 2023-Present | Alaina Weinheimer, Co-mentor |

**Student Committee Service:**

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| 2024 | Brooke Sienkiewicz, PhD Student, UMass Lowell |

## Service

**Reviewer:** Geobiology, Molecular Ecology, FEMS Microbial Ecology, Frontiers in Microbiology, Microbiome, Science Advances, Nature Microbiology, Communications Biology, ISME, NSF

**Bigelow Service**

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| 2023-Present | Education Committee |
| 2022 | ORCA Committee |

**Cornell Service**

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| 2011-2012 | President of the Field of Microbiology Students |

## Teaching and Workshops

### Bigelow Laboratory for Ocean Sciences

2024 The Ocean Environment Lecturer and R Data Lab Instructor, Bigelow Sea Change Semester (11 students)
2024 Data Carpentry Workshop Organizer and Instructor for Wabanaki Public Health (15 learners)
2024 Bioinformatics of Microbial Single Cell Genomes, Chair and instructor (17 participants)
2023 Invited tutorial on Meta'omics for Ocean Science at Ocean Hack Week (30+ participants)
2023 Software Carpentry Workshop Instructor at Colby College Davis Institute for AI (5 learners)
2023 GORG Bioinformatics Jamboree Chair and curriculum coordinator (15 particpants)
2022 Course in Bioinformatics of Microbial Single Cell Genomes, Chair, curriculum coordinator and instructor at Bigelow Laboratory (19 participants)
2022 Software Carpentry Workshop Organizer and Instructor at Bigelow Laboratory (19 learners)
2021 Data Carpentry Workshop Organizer and Instructor at Bigelow Laboratory (25 learners)
2019 Data Carpentry Workshop Organizer and Instructor at Bigelow Laboratory (22 learners)
2018 Data Carpentry Workshop Instructor for New England Tribes, USGS, Augusta, ME (12 learners)

### Cornell University

2014 BioG 1140: Foundations of Biology Teaching Assistant (1 semester, 150 lecture students, 25 study section students)
2014 BioMi 2911: Introduction to Microbiology Laboratory Instructor (1 semester, 20 students)
2013 BioMi 3910: Advanced Laboratory in Microbiology Teaching Assistant (1 semester, 10 students)
2009, 13 BioMi 2911: Introduction to Microbiology Laboratory Teaching Assistant (2 semesters, 20 students)
2009, 13, 14 BioMi 2910: Introduction to Microbiology Lecture Teaching Assistant (3 semesters, 120 students)
2012 Host and speaker at Field of Microbiology Students Bioinformatics Symposium
2008-2014 Introduction to Microbiology small group section instructor (11 semesters, 12 students/semester)

### Carleton College

2006-2008 Organic Chemistry 1 and Chemical Equilibrium and Analysis lab teaching assistant (4 trimesters, 20 students/lab)

## Outreach

### Engagement

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| 2024 | Skype a Scientist classroom engagement while at sea |
| 2023 | July 18 Café Sci Presenter: Science from a Seed: Growing Bold Science from Big Ideas |
| 2018-2020 | Facilitator for mid-coast Maine Girls Who Code |
| 2017 | BLOOM Chaperone, Bigelow open house activities coordinator |
| 2016 | BLOOM Program field volunteer |
| 2016 | Bigelow Laboratory Open House Science Activities Coordinator |
| 2013 | Invited Speaker at Homer Junior High School Career Day |
| 2011, 2009 | Volunteer for Cornell Expand your Horizons workshop for middle school girls |

### Press

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|---|---|
| 2023 | Field Notes piece on ETNP research cruise in Bigelow's Transect Magazine |
| 2023 | Interviewed by Quanta Magazine as outside expert on predation of viruses |
| 2020 | Manuscript on predation of viruses featured in New York Times |
| 2019 | Interviewed by Forbes Magazine about project on tropical and subtropical epipelagic single cell genomes |

## Field Experience and Training

### Field Experience

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| 2024 | Fkt240412: R/V Falkor(too) Microbes in Oxygen Minimum Zones, Virus Lead, Chief Scientist: Maria Pachiadaki |
| 2023 | AT50-08: R/V Atlantis Microbial Processes in the ETNP OMZ, Virus Lead, Chief Scientist: Maria Pachiadaki |
| 2018 | Field collection of marine sponges and tunicates in West Boothbay Harbor, ME |
| 2011-2014 | Field sample collection at Green Lakes State Park, Fayetteville, NY for Dissertation Research |
| 2010 | AT15-61: R/V Atlantis ETSP Research Expedition; Chief Scientist: Dr. Doug Capone |
| 2009, 2010 | Summer Field Research at Shoals Marine Lab, Appledore Island, Gulf of Maine |

### Field Coursework

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| 2011 | Summer Course in Microbial Oceanography at University of Hawaii Center for Microbial Oceanography: Research and Education (C-MORE) |
| 2011 | Cornell Ecology and Evolutionary Biology Tropical Field Ecology Course, Hawaii, Hawaii |
| 2010 | Bermuda Institute of Ocean Sciences (BIOS) Summer Course in Microbial Oceanography |

2007 SEA Semester Oceans and Climate. Research Project: *The Virus to Bacteria Ratio in Changing Nutrient Environments of the Eastern Tropical Pacific;* Advised by Chief Scientist Dr. Kara Lavender Law

**Additional Research Experience and Training**

2018 Data Intensive Biology Summer Research Institute ("DIBSI") Carpentries Instructor Training, UC Davis

2008-2009 Graduate rotation projects: *Exploring the Metabolic Potential of Dehalococcoides ethenogenes and Characterizing Transcription of Reductively Dehalogenating Enzymes of Dehalococcoides ethenogenes*; Advised by Dr. Ruth Richardson and Dr. Stephen Zinder

2007 Carleton College Chemistry Department undergraduate research assistant; *Development of $^{32}P$ assays to Characterize tRNA Structure and tRNA Synthetase Activity;* Advised by Dr. Joe Chihade

2006 Manhattan College Biology Summer Undergraduate Intern: Impacts of As(V) exposure on the sediment amphipod *Leptocheirus plumulosus;* Advised by Dr. Michael Judge

## Oral Presentations

**Julia M. Brown** (October 2, 2024) **Invited Panelist** "Redefining life sciences in Maine" Bioscience Association of Maine Annual Conference, University of New England

**Julia M. Brown** (March 28, 2024) **Invited Seminar**: "Insights into marine viral ecology from connections made within individual microbial cells." Woods Hole Oceanographic Institute Biology Department

**Julia M. Brown** (April 21, 2022) Seminar: "Harnessing genomic information from microbial individuals to better understand marine viruses" Bigelow Laboratory for Ocean Sciences

**Julia M. Brown** (June 24, 2021) Oral Presentation: "Observing virus sequences in thousands of uncultivated host cells using large scale single cell genomics." 2021 ASLO Aquatic Sciences Virtual Meeting

**Julia M. Brown** (March 31, 2021**) Invited Virtual Seminar**: "An unexpected snack for the ocean's tiniest eukaryotes." Maine Maritime Academy

**Julia M. Brown** (September 24, 2020) Seminar: "Caught in the Act: What viruses within cellular SAGs can tell us about ecology and evolution." Bigelow Laboratory for Ocean Sciences

**Julia M. Brown,** Joe Brown, Jessica Labonté, Ramunas Stepanauskas (February 2, 2018) Oral Presentation: "Accumulation of viral DNA in marine picoeukaryote cells suggests the importance of viral ingestion in microbial trophic interactions." Ocean Sciences Meeting, AGU Portland, OR

**Julia M. Brown** (November 18, 2013) **Invited Presentation**: "My Graduate Research and Graduate School Experience." Cornell University Chapter of The American Indian Science and Engineering Society (AISES)

**Julia M. Brown** (November 8, 2013) **Invited Seminar**: "A Viral Graveyard? Comparative Analysis of Viral Metagenomes from the Sediment and Watercolumn of Fayetteville Green Lake." State University of New York at Geneseo, Geneseo, NY

## Poster Presentations

Jacob Munson McGee, Melody Lindsay, **Julia M Brown,** Timothy D'Angelo, Joe Brown, Laura Lubelczyk, Paxton Tomko, David Emerson, Beth Orcutt, Nicole Poulton, Gerhard Herndl, Ramunas Stepanauskas (November 14, 2022) Poster Presentation: "Decoupling of respiration rates and abundance in marine prokaryoplankton" 27th NSF EPSCoR National Conference, Portland, ME

**Julia M. Brown** (October 6, 2022) Poster Presentation: "Snapshots of infection within single cells from the tropical epipelagic ocean" VEGA Symposium, JGI, Berkeley, CA, USA

**Julia M. Brown,** Jessica M. Labonté, Joe Brown, Ramunas Stepanauskas (August 14, 2019) Poster Presentation: "Grazing on viruses? Accumulation of non-infecting viral DNA within picoeukaryote cells." ISME17, Leipzig, Germany

**Julia M. Brown**, Ian Hewson (May 18, 2014) Poster Presentation: "Evidence of Water Column Virus DNA Preserved in the Varved Sediments of Fayetteville Green Lake." American Society for Microbiology General Meeting, Boston, MA

**Julia M. Brown**, Ian Hewson (February 21, 2013) Poster Presentation: "Investigation of Mutation and Migration as Factors influencing cyanophage diversity within two neighboring meromictic lakes" American Society of Limnology and Oceanography Aquatic Sciences Conference, New Orleans, LA

**Julia M. Brown**, Ian Hewson (June 30, 2012) Poster Presentation: "Dynamics of Picocyanobacteria and Viruses in Fayetteville Green Lake", Northeastern Microbiologists: Physiology, Ecology and Taxonomy (NEMPET) Conference, Blue Mountain Lake, NY

**Julia M. Brown**, Ian Hewson (February 17, 2011) Poster Presentation: "Metaviromic Insights into Phage Ecology during a Trichodesmium lysis event" American Society of Limnology and Oceanography (ASLO) Conference, San Juan, Puerto Rico

## Computational Experience

**Github:** https://github.com/juliambrosman

**Developed Software Packages and Code Repositories:**

- SAG-MG-Recruit
- batch-viruSCope
- GORG-figures
- VC-Profiler

**HPC Computing:**

- Bigelow Laboratory for Ocean Sciences HPCC; Linux CentOS
- Job scheduling with PBS-Pro, SLURM

**NGS data experience:**

- Microbial genomics, viral genomics
- Assembly workflow development, assembly curation
- Metagenomic and metatranscriptomic analysis
- Virus sequence identification within single cell genomes

- Comparative analyses of viral metagenomes

**Computing experience:**

- Languages: python, R, bash
- Frequently used Data Science Tools: git, conda, Jupyter, Cytoscape, pandas, networkx, scipy, scikit learn, RStudio, sqlite, XML
- Workflow management: snakemake
- Other Software: Adobe Illustrator, Inkscape
- Operating Systems: Linux CentOS, MacOS