

RIKA E. ANDERSON

Associate Professor

Biology Department, Carleton College

One North College Street • Northfield, MN 55057

randerson@carleton.edu • carleton.edu/directory/randerson/

EDUCATION

University of Washington. Seattle, WA. 2010-2013.
Ph.D. in Oceanography and Astrobiology.

University of Washington. Seattle, WA. 2007-2010.
M.S. in Oceanography.

Carleton College. Northfield, MN. 2002-2006.
B.A. in Biology, Concentration in Environment and Technology Studies.
Magna Cum Laude.

Other coursework

- o Strategies and Techniques for Analyzing Microbial Population Structures summer course, *Marine Biological Laboratory. Woods Hole, MA. August 2012.*
- o SEA Semester, *Sea Education Association. Woods Hole, MA. Spring 2005.*

PROFESSIONAL EXPERIENCE

Associate Professor, Biology Department, Carleton College. 2022-present.

Assistant Professor, Biology Department, Carleton College. 2017-2022.

Visiting Scholar, School of Oceanography, University of Washington. 2019-2021.

Postdoctoral Scientist, Marine Biological Laboratory. 2016.
Advisor: Julie Huber

NASA Astrobiology Institute Postdoctoral Fellow. 2014-2016.
Advisors: Rachel Whitaker (University of Illinois at Urbana-Champaign) and Julie Huber (Marine Biological Laboratory)

Visiting Member of the Faculty, The Evergreen State College. 2014.

PUBLICATIONS

- Boden, J.S., Zhong, J.*, **Anderson, R.E.**, and Stüeken, E. (*In press.*) Timing the evolution of phosphorus-cycling enzymes through geological time. *Nature Communications.*
- Lyons, T., Tino, C., Fournier, G., **Anderson, R.**, Leavitt, W., Konhauser, K., and Stüeken, E. (*In press.*) Co-evolution of early Earth environments and microbial life. *Nature Reviews Microbiology.*

- Zhong, J.*, Osborn, T.*, del Rosario Hernandez, T.*, Kyrtsyuk, O.*, Tully, B.J., and **Anderson, R.E.** (2024) High transpose abundance in the deep ocean is linked to a particulate-associated lifestyle. *mSystems* 0:e00067-24. DOI: [10.1128/mSystems.00067-24](https://doi.org/10.1128/mSystems.00067-24)
- Hu, S., **Anderson, R.E.**, Pachiadaki, M.G., Edgcomb, V.P., Serres, M.H., Sylva, S.P., German, C.R., Seewald, J.S., Lang, S.Q., and Huber, J.A. (2024) Microbial eukaryotic predation pressure and biomass at deep-sea hydrothermal vents: Implications for deep-sea carbon cycling. *The ISME Journal*. 18, wrac004. DOI: [10.1093/ismejo/wrac004](https://doi.org/10.1093/ismejo/wrac004)
- Mateos, K.*, Chappell, G.*, Klos, A.*, Le, B.*, Boden, J., Stüeken, E.E., and **Anderson, R.E.** (2023) The evolution and spread of sulfur-cycling enzymes reflect the redox state of the early Earth. *Science Advances* 9(27), eade4847. DOI: [10.1126/sciadv.ade4847](https://doi.org/10.1126/sciadv.ade4847)
- Hu, S., Smith, A., **Anderson, R.**, Sylva, S., Setzer, M., Steadmon, M., Frank, K., Chan, E., Lim, D., German, C., Breier, J., Lang, S., Butterfield, D., Fortunato, C., Seewald, J., Huber, J. (2022) Globally-distributed microbial eukaryotes exhibit endemism at deep-sea hydrothermal vents. *Molecular Ecology*. DOI: [10.1111/mec.16745](https://doi.org/10.1111/mec.16745)
- Brazelton, W., McGonigle, J., Motamedi, S., Pendleton, H., Twing, K., Lowe, W., Miller, B., Hoffman, A., Prator, C., Chadwick, G., **Anderson, R.E.**, Thomas, E.*, Butterfield, D., Aquino, K., Früh-Green, G., Schrenk, M., Lang, S. (2022) Metabolic strategies shared by basement residents of the Lost City hydrothermal field. *Applied and Environmental Microbiology*. 88, e0092922. DOI: [10.1128/aem.00929-22](https://doi.org/10.1128/aem.00929-22)
- Anderson, R.E.**, Graham, E.D., Huber, J.A., and Tully, B.J. (2022) Microbial population dynamics are dominated by stochastic forces in a low biomass seafloor habitat. *mBio* e00354-22. DOI: [10.1128/mbio.00354-22](https://doi.org/10.1128/mbio.00354-22)
- Cooper, Z.S., Rapp, J.Z., Shoemaker, A., **Anderson, R.E.**, Zhong, Z.P., and Deming, J.W. (2022) Evolutionary divergence of *Marinobacter* strains in cryopeg brines as revealed by pangenomics. *Frontiers in Microbiology* 13, 879116. DOI: [10.3389/fmicb.2022.879116](https://doi.org/10.3389/fmicb.2022.879116)
- Sauer, H.M., Hamilton, T.L., **Anderson, R.E.**, Umbanhowar Jr., C.E., and Heathcote, A.J. (2022) Diversity and distribution of sediment bacteria across an ecological and trophic gradient. *PLOS ONE* 17(3): e0258079. DOI: [10.1101/2021.09.20.461123](https://doi.org/10.1101/2021.09.20.461123)
- Marlow, J.J., **Anderson, R.E.**, Reysenbach, A-L, Seewald, J.S., Shank, T.M., Teske, A., Wanless, V.D., and Soule, S.A. (2022) New opportunities and untapped scientific potential in the abyssal ocean. *Frontiers in Marine Science* 8. DOI: [10.3389/fmars.2021.798943](https://doi.org/10.3389/fmars.2021.798943)
- Anderson, R.E.** (2021) Tracking microbial evolution in the seafloor biosphere. *mSystems* 6, e00731-21. (Invited commentary for the “Early Career Special Issue.”) DOI: [10.1128/mSystems.00731-21](https://doi.org/10.1128/mSystems.00731-21)
- Hoffert, M.*¹, **Anderson, R.E.**¹, Reveillaud, J., Murphy, L., Stepanauskas, R., and Huber, J.A. (2021) Genomic variation influences *Methanothermococcus* fitness in marine hydrothermal systems. *Frontiers in Microbiology* 12, 2435. DOI: [10.3389/fmicb.2021.714920](https://doi.org/10.3389/fmicb.2021.714920)
- Thomas, E.*¹, **Anderson, R.E.**¹, Rogan, J.*, Li, V.*, and Huber, J.A. (2021) Diverse viruses in deep-sea hydrothermal vent fluids have restricted dispersal across ocean basins. *mSystems* 6, e00068-21. DOI: [10.1128/mSystems.00068-21](https://doi.org/10.1128/mSystems.00068-21)
- Kieft, K., Zhou, Z., **Anderson, R.E.**, Buchan, A., Campbell, B.J., Hallam, S., Hess, M., Sullivan, M.B., Walsh, D.A., Roux, S., and Anantharaman, K. (2021) Ecology of inorganic sulfur auxiliary metabolism in widespread bacteriophages. *Nature Communications* 12, 3503. DOI: [10.1038/s41467-021-23698-5](https://doi.org/10.1038/s41467-021-23698-5)
- Eren, A.M., Kiefl, E., Shaiber, A., Veseli, I., Miller, S.E., Schechter, M.S., Fink, I., Pan, J.N.,

- Yousef, M., Fogarty, E.C., Trigodet, F., Watson, A.R., Esen, Ö.C., Moore, R.M., Clayssen, Q., Lee, M.D., Kivenson, V., Graham, E.D., Merrill, B.D., Karkman, A., Blankenberg, D., Eppley, J.M., Sjödin, A., Scott, J.J., Vásquez-Cmpos, McKay, L.J., McDaniel, E.A., Stevens, S.L.R., **Anderson, R.E.**, Fuessel, J., Fernandez-Guerra, A., Maignien, L., Delmont, T.O., & Willis, A.D. (2021) Community-led, integrated, reproducible multi-comics with anvio. *Nature Microbiology* 6, 3-6. DOI: [10.1038/s41564-020-00834-3](https://doi.org/10.1038/s41564-020-00834-3)
- Parsons, C.W.*, Stüeken, E.E., Rosen, C.*, Mateos, K.*, and **Anderson, R.E.** (2021) Radiation of nitrogen-metabolizing enzymes across the tree of life tracks environmental transitions in Earth history. *Geobiology* 19,18-34. DOI: [10.1111/gbi.12419](https://doi.org/10.1111/gbi.12419)
- Baross, J.A., **Anderson, R.E.**, and Stüeken, E.E. (2020) “The Environmental Roots of The Origin of Life.” In *Planetary Astrobiology*, Arizona University Press Space Science Series. Ed. Victoria Meadows, Giada Arney, Britney Schmidt and David DesMarais. DOI: [10.2458/azu_uapress_9780816540068-ch003](https://doi.org/10.2458/azu_uapress_9780816540068-ch003)
- Moulana, A.*¹, **Anderson, R.E.**¹, Fortunato, C.S., and Huber, J.A. (2020) Selection is a significant driver of gene gain and loss in the pangenome of the bacterial genus *Sulfurovum* in geographically distinct deep-sea hydrothermal vents. *mSystems* 5(2), e00673-19. DOI: [10.1128/mSystems.00673-19](https://doi.org/10.1128/mSystems.00673-19)
- Galambos, D.*¹, **Anderson, R.E.**¹, Reveillaud, J., and Huber, J.A. (2019) Genome-resolved metagenomics and metatranscriptomics reveal niche differentiation in functionally redundant microbial communities at deep-sea hydrothermal vents. *Environmental Microbiology* 21(11), 4395-4410. DOI: [10.1111/1462-2920.14806](https://doi.org/10.1111/1462-2920.14806)
- Reveillaud, J., **Anderson, R.E.**, Reves-Sohn, S., Cavanaugh, C., and Huber, J.A. (2018) Metagenomic investigation of vestimentiferan tubeworm endosymbionts from Mid-Cayman Rise reveals new insights into metabolism and diversity. *Microbiome* 6:19. DOI: [10.1186/s40168-018-0411-x](https://doi.org/10.1186/s40168-018-0411-x)
- Anderson, R.E.**, Reveillaud, J., Reddington, E., Delmont, T.O., Eren, A.M., McDermott, J.M., Seewald, J.S., and Huber, J.A. (2017) Genomic variation in microbial populations inhabiting the marine seafloor at deep-sea hydrothermal vents. *Nature Communications* 8(1). DOI: [10.1038/s41467-017-01228-6](https://doi.org/10.1038/s41467-017-01228-6)
- Stüeken, E.E., Buick, R., **Anderson, R.E.**, Baross, J.A., Planavsky, N.J., and Lyons, T.W. (2017) Environmental niches and metabolic diversity in Neoproterozoic lakes. *Geobiology* 15(6), 767-783. DOI: [10.1111/gbi.12251](https://doi.org/10.1111/gbi.12251)
- Anderson, R.E.**, Kouris, A., Seward, C., Campbell, K., and Whitaker, R.J. (2017) Structured populations of *Sulfolobus acidocaldarius* with susceptibility to mobile genetic elements. *Genome Biology and Evolution*. 9(6), 1699-1710. DOI: [10.1093/gbe/evx104](https://doi.org/10.1093/gbe/evx104)
- Campbell, K.M., Kouris, A., England, W., **Anderson, R.E.**, McCleskey, R.B., Nordstrom, D.K., and Whitaker, R.J. (2017) *Sulfolobus islandicus* meta-populations in Yellowstone National Park hot springs. *Environmental Microbiology* 19(6), 2334-2347. DOI: [10.1111/1462-2920.13728](https://doi.org/10.1111/1462-2920.13728)
- Domagal-Goldman, S. D. and Wright, K. E., and 49 authors. (2016) The Astrobiology Primer v2.0. *Astrobiology*, 16(8). DOI: [10.1089/ast.2015.1460](https://doi.org/10.1089/ast.2015.1460)
- Anderson, R.E.**, Sogin, M.L., and Baross, J.A. (2015) Biogeography and ecology of the rare and abundant microbial lineages in deep-sea hydrothermal vents. *FEMS Microbiology Ecology*. 91(1), 1-11. DOI: [10.1093/femsec/fu016](https://doi.org/10.1093/femsec/fu016)
- Anderson, R.E.**, Sogin, M.L., and Baross, J.A. (2014) Evolutionary strategies of viruses and cells in hydrothermal vent ecosystems revealed through metagenomics. *PLOS ONE* 9(10), e109696 DOI: [10.1371/journal.pone.0109696](https://doi.org/10.1371/journal.pone.0109696)

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- Bourbonnais, A., Juniper, S.K., Butterfield, D.A., **Anderson, R.E.** Hallam, S.J., and Lehmann, M.F. (2014) Diversity and abundance of Bacteria and nirS-encoding denitrifiers associated with the Juan de Fuca Ridge hydrothermal system. *Annals of Microbiology* 64(4), 1691-1705. DOI: [10.1007/s13213-014-0813-3](https://doi.org/10.1007/s13213-014-0813-3)
- Anderson, R.E.**, Brazelton, W.J., and Baross, J.A. (2013.) The deep virosphere: Assessing the viral impact on microbial community dynamics in the deep subsurface. *Reviews in Mineralogy and Geochemistry* 75(1), 649-675. DOI: [10.2138/rmg.2013.75.20](https://doi.org/10.2138/rmg.2013.75.20)
- Stüeken, E.E., **Anderson, R.E.**, Bowman, J.S., Brazelton, W.J., Colangelo-Lillis, J., Goldman, A.D., Som, S.M., and Baross, J.A. (2013) Did life originate from a global chemical reactor? *Geobiology* 11(2), 101-126. DOI: [10.1111/gbi.12025](https://doi.org/10.1111/gbi.12025)
- Anderson, R.E.**, Torres Beltrán, M., Hallam, S.J., and Baross, J.A. (2013) Microbial community structure across fluid gradients in the Juan de Fuca Ridge hydrothermal system. *FEMS Microbiology Ecology* 83(2), 324-339. DOI: [10.1111/j.1574-6941.2012.01478.x](https://doi.org/10.1111/j.1574-6941.2012.01478.x)
- Anderson, R.E.**, Brazelton, W.J., and Baross, J.A. (2011) Is the genetic landscape of the deep subsurface biosphere affected by viruses? *Frontiers in Microbiology* 2, 219. DOI: [10.3389/fmicb.2011.00219](https://doi.org/10.3389/fmicb.2011.00219)
- Anderson, R.E.**, Brazelton, W.J., and Baross, J.A. (2011) Using CRISPRs as a metagenomic tool to identify microbial hosts of a diffuse flow hydrothermal vent viral assemblage. *FEMS Microbiology Ecology* 77, 120-133. DOI: [10.1111/j.1574-6941.2011.01090.x](https://doi.org/10.1111/j.1574-6941.2011.01090.x)
- Anderson, R.E.**, Ostrowski, A.D., Gran, D.E., Fowler, J.D., Hopkins, A.R., and Villahermosa, R.M. (2008) Diameter-controlled synthesis of polyaniline nanofibers. *Polymer Bulletin*, 61(5). DOI: [10.1007/s00289-008-0983-x](https://doi.org/10.1007/s00289-008-0983-x)
- Biddle, J.F., Lipp, J.S., Lever, M., Lloyd, K., Sørensen, K., **Anderson, R.E.**, Fredricks, H.F., Elvert, M., Kelly, T.J., Schrag, D.P., Sogin, M.L., Brenchley, J.E., Teske, A., House, C.H., and Hinrichs, K-U. (2006) Heterotrophic Archaea dominate sedimentary subsurface ecosystems off Peru. *Proceedings of the National Academy of Sciences, U.S.A.* 103, 3846-3851. DOI: [10.1073/pnas.0600035103](https://doi.org/10.1073/pnas.0600035103)

MANUSCRIPTS IN REVIEW/PREPRINTS

*Undergraduate student author.

¹Shared first authorship.

HONORS AND AWARDS

Scialog Fellow, Signatures of Life in the Universe initiative. 2020-present. *Selected as a fellow among early career faculty to engage in multi-year workshops to address scientific challenges of global significance.* <https://rescorp.org/scialog/signatures-of-life-in-the-universe>

Global Fellow, University of St. Andrews. 2020. *Competitively selected as a fellow to engage with the scholarly community at the University of St. Andrews.* <https://www.st-andrews.ac.uk/research/global-fellowship-scheme/>

NASA Postdoctoral Fellow. 2013.

MO BIO Best Poster Award, ISME14 Conference. 2012.

ISME14 Student Poster Award, ISME14 Conference. 2012.

Integrative Graduate Education and Research Traineeship (IGERT) Fellow. 2009.

National Science Foundation (NSF) Graduate Research Fellow. 2007.

Achievement Rewards for College Scientists (ARCS) Fellow. 2007. *\$17,500 merit-based fellowship awarded to one prospective graduate student in the department.*

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Elected member, Phi Beta Kappa Honor Society. 2006.

Elected member, Sigma Xi Research Society. 2006.

Dean's List, Carleton College, 2002-2004, 2004-2005.

Carleton College Merit Scholarship, 2002.

National Merit Finalist. 2002.

GRANTS AWARDED

(note: amount awarded reflects the amount received by me, not the total grant budget.)

External:

NASA Interdisciplinary Consortia for Astrobiology Research. Co-investigator. Project title: "The Virtual Planetary Laboratory: Advancing the Search for Life on Exoplanets." Amount awarded: \$104,699. Awarded 2023.

NSF Biological Oceanography Directorate. Co-Investigator. Project title: "Collaborative Research: RUI: Microbes need frenemies: unveiling microbial relationships with protists and viruses that support deep-sea hydrothermal vent food webs." Amount awarded: \$68,385. Awarded 2022.

NSF Biological Oceanography Directorate. Principal Investigator. Project title: "CAREER: Temporal dynamics of microbial and viral function and adaptation in hydrothermal vents." Amount awarded: \$614,024. Awarded 2021. *(CAREER grants are NSF's most prestigious award to early-career faculty, supporting those with the "potential to serve as academic role models in research and education and to lead advances in the mission of their department or organization.")*

Research Corporation for Science Advancement (RSCA) Scialog Signatures of Life in the Universe (SLU) Collaborative Award. Co-investigator. Project title: "Long term controls on the scope of the Earth's biosphere." Amount awarded: \$55,000. Awarded 2021. *(Awarded to projects considered "highly innovative with potential to transform their field of research and address critical global issues.")*

Booth Fund, University of Washington. Co-investigator. Project title: "Ocean Memory: Sequencing metagenomes from the Salish Sea." Amount awarded: \$15,800. Awarded 2020.

Ocean Memory Project Seed Grant. Co-investigator. Project title: "Blue Dreams: A video projection artwork of ocean memory at monumental scale for global audiences." Awarded 2020. Final production was exhibited at the National Academy of Sciences and at the UN Ocean Decade Conference in Barcelona. *Note that I did not directly receive funds for this project; the money was awarded for artists's fees.*

Department of Energy Joint Genome Institute Community Science Program.

Principal Investigator. Project title: "Microbial and viral mediation of biogeochemical cycles from source to sink in hydrothermal vent systems." Awarded 2019. *Sequencing grant: no money was transferred; agency sequenced DNA samples, equivalent to approximately \$53,000.*

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NASA Astrobiology Institute Cooperative Agreement Notice 8. Co-Investigator. Project title: “The Virtual Planetary Laboratory: Advancing the Search for Life Beyond the Solar System.” Amount awarded: \$130,169. Awarded 2018.

NASA Exobiology & Evolutionary Biology. Co-investigator. Project title: “Elucidating the role of viruses in shaping microbial adaptation and evolutionary trajectories in the seafloor of deep-sea hydrothermal vents.” Amount awarded: \$7,289. Awarded 2018.

Deep Carbon Observatory Census of Deep Life Sequencing Grant. Principal Investigator. Project title: “Elucidating the impacts of drift and selection on the evolution of seafloor microbial populations in high-temperature vent fluids from the Mid-Cayman Rise.” Awarded 2015. *Sequencing grant: no money was transferred; agency sequenced DNA samples, equivalent to approximately \$7,000.*

Gordon and Betty Moore Foundation Marine Phage, Virus, and Virome Sequencing Grant. Co-investigator. Project title: “Viral metagenomics at a deep-sea hydrothermal vent.” Awarded 2009. Sequencing grant: no money was transferred; agency sequenced DNA samples, equivalent to approximately \$10,000.

Carleton (Internal):

Large Faculty Development Endowment. “*Viruses as drivers of evolution in deep-sea hydrothermal vents.*” Awarded 2018.

Class of 1949 Endowed Fund for Faculty Development. “*Viruses as drivers of evolution in deep-sea hydrothermal vents.*” Awarded 2018.

Small Faculty Development Endowment. “*Microbial Ecology of the Cannon River Watershed: A hands-on bioinformatics opportunity for students.*” Awarded 2018.

Puzak Fund for Experiential Learning and Community Engagement. “*C.O.W.S. (Conversations on the Wonders of Science): A Northfield Community Science Café.*” Awarded 2017.

Broom Public Scholarship Grant. “*C.O.W.S. (Conversations on the Wonders of Science): A Northfield Community Science Café.*” Awarded 2017.

TEACHING EXPERIENCE

Assistant/Associate Professor. *Carleton College, Northfield, MN.*

BIOL 338/339: Genomics and Bioinformatics and laboratory.
Annually, 2017-present.

BIOL 126/126L: Energy Flow in Biological Systems and laboratory.
2017-2022.

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BIOL125: Genes, Development, and Evolution.

Annually, 2023-present.

IDSC198: FOCUS seminar.

2023-2024.

BIOL 378. Seminar: The origin and early evolution of life.

Annually, 2018-present.

IDSC258: Consensus or Contentious? Controversies in Science Then and Now

Annually, 2023-present.

BIOL 394: Directed Research in Biology.

Every term, 2017-present.

BIOL 400: Comprehensive Exercise.

Annually, 2018-present.

Instructor. *University of Illinois at Urbana-Champaign, Urbana, IL.*

GEOL593: Life in the Universe. Fall Semester, 2014.

Visiting Member of the Faculty. *The Evergreen State College, Olympia, WA.*

Our Changing Oceans: Bringing Together Science and Policy. Winter Quarter, 2014.

Pre-doctoral Instructor. *University of Washington, Seattle, WA.*

OCEAN 220: Field Investigations in Oceanography. Spring Quarter, 2013.

Teaching Assistant. *University of Washington, Seattle, WA.*

OCEAN 444: Advanced Field Oceanography. Winter Quarter, 2011.

OCEAN 443: Design of Oceanographic Field Experiments. Fall Quarter, 2010.

ASTRO/BIOL/ESS/OCEAN 115: Introduction to Astrobiology. Winter Quarter, 2009.

Invited Lecturer/Guest Teacher. 2009-2021.

Astrobiology: History of life in the universe (University of Arizona)

Marine Science (Swarthmore College)

Oceanography (St. Olaf College)

Focusing on Cultivating Scientists (Carleton College) (3 times)

Genetics (St. Paul Academy) (3 times)

Exploration and Empire: Argument & Inquiry Freshman Seminar (Carleton College) (2 times)

Ocean Science (Hong Kong University of Science and Technology) (2 times)

Marine Biology (University of Washington)

Special Topics in Biological Oceanography (University of Washington) (2 times)

Introduction to Biological Oceanography (University of Washington) (2 times)

Rocks 'n Stars (University of Washington)

Marine Science (Garfield High School, Seattle)

General science (Spanaway Middle School, Tacoma)

RESEARCH STUDENTS MENTORED

(institution listed in header denotes the location where the students were mentored.)

University of St. Andrews

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Joanne Boden, 2021-present. Postdoctoral fellow.

Carleton College (*all students listed are Carleton students unless otherwise noted*)

Esmeralda Garcia-Ramirez '25. 2024-present.

Alice Lin '27. 2024-present.

Katherine Opria '26. 2024-present.

Victoria Owusu '26. 2023-present.

Will Puzella '25. 2024-present.

Brian Caplan '25. 2024-present.

Ella Wiegman '25. 2023-present.

Elena Parkerson '25. 2023-present.

Caroline Lee '24. 2023-present.

Tony Ni '25. 2022-present.

Max Borden '25. 2023-present.

Alice McClain '24. 2023.

Sophie Baggett '23. 2023-2023.

Sadie DiCarlo '25. 2022-2023.

Elijah Jones '23. 2022-2023.

Eway Cai '23. 2022-2023.

Elliot Hanson '23. 2022-2023.

Bryan Le '23. 2022-2023.

Aya Klos '23. 2022-2023.

Eve Farrell '22. 2021-2022.

Jimmy Zhong '23. 2021-2023.

Emily Schulenberg '22. 2021-2022.

Garrett Chappell '22. 2021-2022.

Maddie Boulis '23. 2021.

Katherine McFerrin '22. 2021-2022.

Kenyon Nystrom '22. 2021-2022.

Nghi Lam '22. 2021-2022.

Thandie Mangena '22. 2021.

Katherine Mateos '21. 2019-2021. (Currently: graduate student at UCSC.)

Caleb Rosen '20. 2019. (Currently: graduate student at USC.)

Qianzi Li '21. 2019, 2021-present.

Ryan Gilbert '21. 2019.

Anja Leitz-Najarian '21. 2019.

Katherine Rigney '20. 2019.

Thais del Rosario Hernandez '20. 2019.

Jenni Rogan '19. 2019. (Currently: graduate student at University of Virginia.)

Nayoung Kwak '19. 2017-2019.

Alief Moulana '19. 2018-2019. (Educational Associate.) (Currently: graduate student at Harvard.)

Elaina Thomas '18. 2018. (Educational Associate.) (Currently: graduate student at UW.)

Viola Li '19, 2018.

Alex Whitis '20. 2018.

Sasha Kyrysyuk '20. 2017-2018. (Currently: research associate at Dana Farber Cancer Institute.)

Victor Huerta '18. 2017-2018. (Currently: graduate student at University of Cincinnati.)

Michael Hoffert '18. 2017-2018. (Currently: graduate student at CU Boulder.)

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Chris Parsons '18. 2017-2018. (Currently: graduate student at MIT.)
David Galambos '20. 2017-2019. (Currently: graduate student at MIT.)
Will Pangburn '20. 2017.
Jackson Raynor '17. 2017.
John Addicks O'Toole. 2017. High school student, St. Paul Academy.

Marine Biological Laboratory

Petra Byl. 2015, 2016. Undergraduate, University of Chicago. (Currently: graduate student at UH Manoa.)
Cierra Armstrong. 2015. Undergraduate, Cape Cod Community College.

University of Illinois at Urbana-Champaign

Angelo Blancaflor. 2014. Undergraduate, University of Illinois.

University of Washington

Elizabeth Monaghan. 2013. Undergraduate, University of Washington. (Currently: graduate student at UH Manoa.)
Rhys Lloyd. 2013. Undergraduate, University of Washington.
Nadine Harrison. 2013. Undergraduate, University of Washington.
Brenna Adelman. 2013. High school student, Roosevelt High School.
Stephen Jensen. 2011-2012. Undergraduate, University of Washington.
Annie Doubleday. 2011. Undergraduate, Carleton College.
Florence van Tulder. 2010-2011. Undergraduate, University of Washington.
Carly Gott. 2010. Undergraduate, California Polytechnic State University.

FIELD EXPERIENCE

Oceanographic Research Cruises

- Axial Seamount, 2023, R/V *Thomas G. Thompson*/ROV *JASON*, PI of 2 ancillary science days, hydrothermal vent microbial sampling.
- Axial Seamount, 2022, R/V *Thomas G. Thompson*/ROV *ROPOS*, PI of 2 ancillary science days (directed from shore), hydrothermal vent microbial sampling.
- Mid-Cayman Rise, 2020, R/V *Atlantis*/ROV *Jason*, scientific participant, hydrothermal vent microbial sampling.
- Salish Sea, 2019, R/V *Rachel Carson*, scientific participant, water column microbial sampling.
- East Pacific Rise, 2018, R/V *Atlantis*/HOV *Alvin*, selected as an early career scientist for a chief scientist training cruise, hydrothermal vent microbial sampling.
- Lost City, 2018, R/V *Atlantis*/ROV *Jason*, scientific participant (directed from shore), hydrothermal vent microbial sampling.
- Hawaiian waters, 2012, R/V *Thomas G. Thompson*, TA for undergraduate senior thesis cruise.
- Axial Seamount/Juan de Fuca Ridge, 2009, R/V *Atlantis*/HOV *Alvin*, scientific participant, hydrothermal vent microbial sampling.
- Axial Seamount/Juan de Fuca Ridge, 2008, R/V *Atlantis*/HOV *Alvin*, scientific participant, hydrothermal vent microbial sampling.
- Sargasso Sea, 2005, SSV *Corwith Cramer*, SEA Semester.

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Geological Field Excursions

- Yellowstone, 2014, geothermal hot spring microbial sampling.
- Cyprus, 2009, collection of hydrothermal sulfides for isotopic geochemistry.

LEADERSHIP, ACTIVITIES, AND SERVICE

Co-organizer, Universal Fluid Obtainer (UFO). 2019-present.

Helped initiate and develop efforts to design and build a community fluid sampler for use with National Deep Submergence Facility vehicles.

Member, Abyss Workshops Committee. 2020-present.

Served on a committee to organize a series of online and in person workshops to explore science objectives for studying the oceanic abyss.

Member, The Ocean Memory Collective. 2017-present.

Member of a group of scientists, artists, and other academics working together to address the theme of “ocean memory” through artistic/scientific collaboration and scientific research. Included participation in several workshops as well as an oceanographic research cruise.

Workshop organizer, Center for Dark Energy Biosphere Investigations (C-DEBI) Subsurface Evolution workshop. 2018.

Co-proposed and co-organized a workshop on evolution in the deep subsurface. 20 attendees, New York City.

Member, Blue Marble Space Institute of Science. 2013-2019.

Non-profit virtual research institute with a focus on interdisciplinary astrobiology research and science education and outreach.

Manuscript reviewer for the following journals:

Science, Proceedings of the National Academy of Sciences USA, Nature Ecology and Evolution, Nature Communications, Geobiology, mSystems, Genome Biology and Evolution, Microbiome, mSphere, Communications Biology, Bioinformatics, Environmental Microbiology, The ISME Journal, FEMS Microbiology Ecology Journal, Frontiers in Marine Science, Frontiers in Microbiology, Astrobiology, Journal of Molecular Evolution, Marine Genomics, PLoS ONE.

Proposal reviewer for the following programs:

NASA Interdisciplinary Consortia for Astrobiology Research (ICAR), NASA Future Investigators in Earth and Space Science Technology (FINESST), NSF Biological Oceanography Program, NASA Exobiology Program, NSF Ocean Technology and Interdisciplinary Collaboration (OTIC), NASA Earth and Space Science Fellowship Program (NESSF), NSF Ocean Sciences Postdoctoral Fellowship Program, French National Research Agency (ANR).

Conference organizer

Session Co-chair, “Chance and Necessity: From Molecules and Viruses to Cells and Populations.” Astrobiology Science Conference 2015, Chicago, IL.

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Acting Session Co-chair, “Biodiversity, adaptation and interaction in extreme environments II.” International Symposium on Microbial Ecology 15, Seoul, South Korea.

Abstract reviewer, Astrobiology Student Conference. 2012.

Organizing Committee Member, Astrobiology Graduate Student Conference, Sweden. 2010.

Organizing Committee Member, Astrobiology Graduate Student Conference, Seattle. 2009.

Authorship on public documents

Lead Author, Astrobiology Graduate Student Conference Charter, NASA Astrobiology Institute. 2011.

Contributing Author, Astrobiology Lab Manual, University of Washington. 2009.

Service within Carleton College

Focusing on Cultivating Underrepresented Scientists cohort mentor: 2023-2024.

New faculty cohort mentor: 2023-2024.

Faculty Affairs Committee (FAC): 2020-2023.

STEM Board: 2018, 2020-2022.

Student Fellowship Committee: 2017-2019.

Jean Schmidt Prize Committee: 2017-2019, 2023.

INVITED PRESENTATIONS

Wonders of the deep: Using genomics to assess microbial evolutionary processes in the deep oceans. *Bigelow Laboratory for Ocean Sciences, ME, 2024.*

Reconstructing the evolutionary history of microbial metabolisms of life’s chemical elements. *Astrobiology Science Conference, Providence, RI, 2024.*

Unlocking secrets of microbial evolution in Earth’s oceans through genomics. *Department of Ocean Sciences, University of California, Santa Cruz, CA, 2023.*

Wonders of the Deep: microbial ecology and evolution in deep-sea hydrothermal vents. *Research Center for Deep Sea, National Research and Innovation Agency, Indonesia. 2023.*

Tracking the evolution and spread of microbial metabolisms through Earth history. *Astrobiology and Planetary Science, Georgia Tech, 2022.*

Hydrothermal vents, the origin of life, and beyond. *University of St. Andrews, 2022.*

Wonders of the Deep: Microbial ecology and evolution deep-sea hydrothermal vents. *Marine Biology, Scripps Institution of Oceanography, 2022.*

Tracking the evolution and spread of microbial metabolisms through Earth history. *Annual Meeting of the Japanese Society for Microbial Ecology, 2021.*

How to Build Capacity for a Thriving Research Lab at a Primarily Undergraduate Institution. (Co-panelist.) *Center for Dark Energy Biosphere Investigations Virtual Meeting Series, 2021.*

Wonders of the deep: Exploring microbial ecology and evolution in deep-sea hydrothermal vents. (Keynote speaker.) *Southeastern Biogeochemistry Symposium, 2021.*

Tracking the evolution of the nitrogen cycle through deep time. *University of St. Andrews, 2020.*

Evolution, communication and memory in the microbes of the ocean. (Co-panelist.) *Ocean Memory Project Web Seminar Series, 2020.*

Denizens of the Deep: Charismatic microfauna in hydrothermal vents. *Gonzaga University, 2020.*

Microbial function and functional plasticity across hydrothermal vent habitats. *Center for Dark Energy*

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Biosphere Investigations Annual Meeting, 2019.

Differences in functional potential provide an advantage to specific microbial lineages in distinct hydrothermal vent habitats. *American Geophysical Union Fall Meeting, 2019.*

Searching for Life on Ocean Worlds: What Can Earth Teach Us? (Plenary). *Astrobiology Science Conference, 2019.*

Evolution of microbial populations in deep-sea hydrothermal vents. *2nd Annual Geobiology Conference, 2019.*

Wonders of the Deep: Microbial ecology and evolution in deep-sea hydrothermal vents. *Macalester College, 2019.*

Wonders of the Deep: Exploring microbial ecology and evolution in deep-sea hydrothermal vents. *University of Minnesota Duluth, 2019.*

Genomic memories of the past: Using microbial genomics to examine the co-evolution of Earth and life. *University of Washington, 2018.*

Wonders of the Deep: Exploring microbial ecology and evolution in deep-sea hydrothermal vents. *Stony Brook University, 2018.*

Wonders of the Deep: Investigating microbial evolution and ecology in deep-sea hydrothermal vents using metagenomics. *Northern Illinois University, 2018.*

Wonders of the deep: Understanding microbial evolution in deep-sea hydrothermal vents. *Oberlin College, 2016.*

Unraveling the impact of environmental dynamics on the microbial pangenome. *University of Massachusetts at Amherst, 2016.*

The origin of microbial species: Peering into microbial genomes to understand microbial adaptation into new ecological niches. *University of Washington Astrobiology Program, 2014.*

Viral manipulation of the genetic landscape of deep subsurface microbial communities. *C-DEBI Networked Speaker Series, 2012.*

Vents, viruses, and the origin of life. *University of Washington Marine Geology & Geophysics program, 2011.*

CONTRIBUTED CONFERENCE PRESENTATIONS: ORAL

Anderson, R.E. When students become the teachers: Astrobiology as a STEM recruitment tool for undergraduate and K-12 students. *Astrobiology Science Conference, Seattle, WA, 2019.*

Anderson, R.E., Huber, J.A., Parsons, C.*, and Stüeken, E. Insights into recent and ancient trends in the co-evolution of earth and life as revealed by microbial genomics. *American Geophysical Union Fall Meeting, New Orleans, LA, 2017.*

Anderson, R.E., Huber, J.A. Evolution of microbial populations in deep-sea hydrothermal vent habitats. *Astrobiology Science Conference, Mesa, AZ, 2017.*

Anderson, R.E., Reveillaud, J., Reddington, E., Delmont, T.O., Eren, A.M., McDermott, J.M., Seewald, J.S., and Huber, J.A. Microevolutionary dynamics of subseafloor *Methanothermococcus* populations in high-temperature vent fluids from the Mid-Cayman Rise. *Third Deep Carbon Observatory International Science Meeting, St. Andrews, Scotland, 2017.*

Anderson, R.E., Reveillaud, J., Eren, A.M., Stepanauskas, R., and Huber, J.A. Genomic variation of subseafloor archaeal and bacterial populations from venting fluids at the Mid-Cayman Rise. *American Geophysical Union Fall Meeting, San Francisco, 2015.*

Anderson, R.E., Kouris, A., Seward, C., and Whitaker, R. Unraveling the impact of ecological selection pressures on the pangenome of *Sulfolobus acidocaldarius*. *Astrobiology Science Conference, Chicago, 2015.*

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- Anderson, R.E.**, Sogin, M.L., and Baross, J.A. Evolutionary strategies of cells and viruses in hydrothermal vent systems revealed through metagenomics. *American Geophysical Union Fall Meeting, San Francisco, 2013.*
- Anderson, R.E.**, Brazelton, W.J., and Baross, J.A. Microbial survival and adaptation in the deep biosphere: What is the viral role? *Astrobiology Science Conference, Atlanta, 2012.*
- Anderson, R.E.**, Brazelton, W.J., and Baross, J.A. Assessing the nature of virus-host coevolution in hydrothermal vent systems through metagenomics. *Astrobiology Science Conference, Atlanta, 2012.*
- Brazelton, W.J., **Anderson, R.E.**, Mehta, M.P., and Baross, J.A. (2010) Lateral gene transfer in hydrothermal vents. *ISME13 Conference, Seattle, WA, 2010.*
- Anderson, R.E.** and Baross, J.A. Viral ecology and evolution in hydrothermal vents. *Astrobiology Science Conference, Houston, 2010.*

CONTRIBUTED CONFERENCE PRESENTATIONS: POSTER

- Anderson, R.E.**, Reveillaud, J., Murat Eren, A., McDermott, J., Seewald, J., Stepanauskas, R., and Huber, J. A. "Strain-level variation of subsurface microbial populations from venting fluids at the Mid-Cayman Rise." *ISME16 Conference, Montreal, Canada, 2016.*
- Anderson, R.E.**, Reveillaud, J., Eren, Murat Eren, A., and Huber, J.A. "Strain-level variation of subsurface archaeal and bacterial populations from venting fluids at the Mid-Cayman Rise." *Center for Dark Energy Biosphere Investigations Annual Meeting, Marina, CA, 2015.*
- Anderson, R.E.** and members of the Blue Marble Space Institute of Science. "Hands On, Minds On" STEM Teaching: Development of a High School Summer Academy. *Astrobiology Science Conference, Chicago, IL, 2015.*
- Anderson, R.E.**, Kouris, A., Seward, C., and Whitaker, R.J. Patterns of variation in archaeal genomes from geothermal environments. *ISME15 Conference, Seoul, South Korea, 2014.*
- Anderson, R.E.**, Brazelton, W.J., and Baross, J.A. Viral manipulation of the genetic landscape of hydrothermal vent microbial communities. *ISME14 Conference, Copenhagen, Denmark, 2012.*
- Anderson, R.E.**, Brazelton, W.J., and Baross, J.A. Do viruses affect the genetic landscape of the deep biosphere? *Origins Conference, Montpellier, France, 2011.*
- Anderson, R.E.**, Brazelton, W., and Baross, J. Using metagenomics and CRISPR analyses to study hydrothermal vent viral communities. *ISME13 Conference, Seattle, WA, 2010.*
- Anderson, R.E.**, Brazelton, W.J., and Baross, J. A. CRISPRs of hydrothermal vent isolates reveal insights into the co-evolution of thermophilic viruses and their hosts. *Viruses of Microbes Conference, Paris, France, 2010.*
- Anderson, R. E.** and Poole, A.M. Tracing origins: Is reconstruction of the deep past possible? *Society for Molecular Biology and Evolution Conference, 2010.*
- Anderson, R.E.** and the UW Origin of Life Research Group. The onset of selection through cooperative replicating network within the context of a seafloor convection model. *Gordon Conference on the Origin of Life, Galveston, TX, 2010.*
- Anderson, R.E.**, Ewert, M., Stueeken, E. and OoL seminar 2009. The World-Wide-Web Origin of Life: using a collaborative website as a tool to develop an integrative model for the origin of life. *Astrobiology Graduate Student Conference, Seattle, WA, 2009.*
- Robinson, T.D., **Anderson, R.E.**, and Meadows, V.S. A suite of activities developed for an introductory astrobiology course for non-science majors. *Astrobiology Graduate Student Conference, Seattle, WA, 2009.*

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Anderson, R.E., Brazelton, W.J., Collins, R.E., Ewert Sarmiento, M., Fuchsman, C.A., Goldman, A.D., Harnmeijer, J., Lin, M-H, Opatkiewicz, A.D., Som, S.M., Steeuken, E. A course in the origin of life as a model for meeting the goals of an astrobiology curriculum. *Astrobiology Science Conference, 2008, and Astrobiology Graduate Student Conference, 2008, Santa Clara.*

CONFERENCE PRESENTATIONS BY STUDENTS

- Ni, Z.*, Zhong, J.*, Boden, J., Stüeken, E., and **Anderson, R.E.** Tracing biosphere evolution under nutrient limitation: A phylogenomic approach. *Astrobiology Science Conference, Providence, RI, 2024. (oral)*
- Klos, A.*, Le, B.*, Leonetti, A.*, Ni, T.*, Zhong, J.*, Boden, J., Stüeken, E., and **Anderson, R.E.** Understanding nutrient limitation on the early Earth via genomics approach. *Goldschmidt Conference, Lyon, France, 2023. (poster)*
- Zhong, J.*, del Rosario Hernandez, T.*, Kyrasyuk, O.*, Tully, B.J., and **Anderson, R.E.** High abundance of transposes in the deep sea: Particles as a highway for gene exchange. *Astrobiology Science Conference, Virtual, 2022. (Online discussion session)*
- Chappell, G.*, Mateos, K.*, Stüeken, E.E., and **Anderson, R.E.** The evolution and spread of sulfur-cycling metabolic genes reflects the redox state of the early Earth. *Astrobiology Science Conference, Virtual, 2022. (Online discussion session)*
- Mateos, K.*, Stüeken, E., and **Anderson, R.E.** Reconstructing the evolutionary history of dissimilatory sulfur cycling genes. *American Geophysical Union Fall Meeting, Virtual, 2020. (poster)*
- Thomas, E.*, **Anderson, R.E.**, Li, V.*, Rogan, J.*, and Huber, J.A. Diverse viruses in deep-sea hydrothermal vent fluids have restricted dispersal across ocean basins. *American Geophysical Union Fall Meeting, Virtual, 2020. (poster)*
- Moulana, A.*, **Anderson, R.E.** and Huber, J.A. Inferring the structure and evolution of the *Sulfurovum* pangenome from deep-sea hydrothermal vent metagenomes. *Astrobiology Science Conference, Seattle, WA, 2019. (oral)*
- del Rosario Hernández, T.*, Kyrasyuk, O.*, and **Anderson, R.E.** Mobile genetic elements as a source of diversity and adaptation in microbial populations in extreme environments. *Astrobiology Science Conference, Seattle, WA, 2019. (poster)*
- Moulana, A.* and **Anderson, R.E.** Inferring the pangenomic structure and evolvability of *Sulfurovum* and *Arcobacter* in deep-sea hydrothermal vents through metagenomic data. *Annual Biomedical Research Conference for Minority Students, Indianapolis, IN, 2018. (poster)*
- Hoffert, M.C.*, **Anderson, R.E.**, Stepanauskas, R., and Huber, J.A. Microevolutionary dynamics in *Methanothermococcus* populations from deep-sea hydrothermal vents in the Mid-Cayman Rise. *American Geophysical Union Fall Meeting, New Orleans, LA, 2017. (poster)*
- Galambos, D.A.*, **Anderson, R.E.**, Reveillaud, J., and Huber, J.A. Characterizing the metatranscriptomic profile of archaeal metabolic genes at deep-sea hydrothermal vents in the Mid-Cayman Rise. *American Geophysical Union Fall Meeting, New Orleans, LA, 2017. (poster)*

*Denotes undergraduate student author.

EDUCATION AND PUBLIC OUTREACH

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C.O.W.S.: Conversations on the Wonders of Science, 2017-2020. Co-organizer of a science café for the local community.

BMSIS Astrobiology Science Academy, 2016. Co-organized and taught a week-long course for underprivileged high school students in Tucson, AZ.

Academy Counselor. 2013.

UK Summer Astrobiology Academy. UK Centre for Astrobiology, Edinburgh, Scotland.
High school summer academy for high-achieving students.

Volunteer Instructor. 2010-2013.

Ocean Inquiry Project, Puget Sound, Washington.

Educational program takes students on one-day cruises in Puget Sound.

Outreach Volunteer. 2007-2014.

- *Meet a Microbiologist*: collaboration with a children's book author to bring microbiologists in to K-12 classrooms via Skype.
- *Genome Day*, Orpheum Children's Museum, Champaign, Illinois
- *Astrobiology: Life in the Universe*: Pacific Science Festival, the Pacific Science Center, Seattle.
- *Life in hydrothermal vents*: Lakewood high school field trip to the UW (multiple events.)
- *Microbes Everywhere*: Paws on Science, Pacific Science Center, Seattle.
- *Microworlds*: Elementary school field trip to the UW.
- Science Night at local elementary schools (multiple events).

Public Presentations.

- Hydrothermal vents! (Co-panelist.) *WHOI Ocean Encounters virtual panel, 2023.* <https://www.whoi.edu/multimedia/oe-hydrothermal-vents/>
- What Is Life and How Did It Begin? (Co-panelist.) *University of Washington Astrobiology Program, "The Biggest Questions in the Universe" Public Panels, 2021.*
- Wonders of the deep: Life in deep-sea hydrothermal vents. *Invited Carleton Connects virtual presentation, 2019.* <https://www.carleton.edu/alumni/connect/carleton-connects/news/carleton-connects-rika-anderson-06-on-deep-sea-hydrothermal-vents/>
- Wonders of the deep: Life in the ocean's darkest corners. *"Science on Tap" oral presentation, Third Place Pub, Seattle, 2013.*
- Life in the deep. *Invited oral presentation to Achievement Rewards for College Scientists (ARCS) leadership and the University Club, Seattle, 2013.*
- From the far reaches of space to the depths of the oceans. *Invited oral presentation to ARCS leadership, Seattle, 2013.*
- Viruses of the deep: exploring evolution in the world's darkest, hottest habitats. *Invited oral presentation to ARCS leadership, Seattle, 2012.*

MEDIA AND PRESS

BBC Earth/PBS Nova, 2023. Featured scientific contributor for *Ancient Earth*, a documentary about the evolution of life on the early Earth, in the episode "Birth of the Sky." <https://www.pbs.org/video/ancient-earth-birth-of-the-sky-vgs18a/>

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- NASA Astrobiology Research Highlights**, 2023. “The evolution and spread of sulfur cycling enzymes.” Article about a paper co-authored with my students. <https://astrobiology.nasa.gov/news/the-evolution-and-spread-of-sulfur-cycling-enzymes/>
- Space on the Page podcast**, 2022. “To Be Taught if Fortunate.” Conversation with Astrobiology Blumberg Chair Lucas Mix and science fiction writer Becky Chambers, hosted by the Library of Congress. <https://podcasts.apple.com/us/podcast/space-on-the-page-podcast/id1614649231>
- NASA Astrobiology Research Highlights**, 2020. “The Gain and Loss of Genes at Hydrothermal Vents.” Article about a paper co-authored with a Carleton student. <https://astrobiology.nasa.gov/news/the-gain-and-loss-of-genes-at-hydrothermal-vents/>
- ManyWorlds column**, 2020. “Viruses, the Virosphere, and Astroviology.” Article for which I was interviewed. <https://manyworlds.space/2020/04/17/viruses-the-virosphere-and-astroviology/>
- Academic Minute**, 2018. A podcast featuring academic interviews. <https://academicminute.org/2018/11/rika-anderson-carleton-college-hydrothermal-vents/>
- Northfield News**, 2017. “COWS Starting Conversations on Science.” Article about a science café that I co-founded. https://www.southernminn.com/northfield_news/news/article_9142c257-e3ca-5596-bc40-090bb2e9f5a2.html
- Astrobiology Magazine**, 2015. “Viruses help microbial hosts cope with life at the extremes.” Article about my PhD work. <https://www.astrobio.net/extreme-life/viruses-help-microbial-hosts-cope-with-life-at-the-extremes/>