Sean M. Gibbons

Institute for Systems Biology (ISB)
401 Terry Ave. N., Seattle, WA 98109
email sgibbons@isbscience.org
website https://gibbons.isbscience.org
github https://github.com/Gibbons-Lab
twitter https://twitter.com/gibbological

Education

University of Chicago PhD, biophysical sciences 2011-2015
- advisers: Profs. Jack Gilbert and Maureen Coleman
- dissertation title: *Multiscale microbial systems ecology and evolution*.

Uppsala University MSc, microbiology 2009-2010
- adviser: Prof. Peter Lindblad
- thesis title: *Synthetic Biology for Renewable Energy*.

The University of Montana BA/BSc/BA, molecular biology/microbiology/French 2002-2008
- undergraduate research adviser: Prof. James Gannon
- minor: chemistry
- undergraduate honors thesis: Translation of "*Connemara Moonshine*" (collection of poems by Mark Gibbons) into French, supervised by Prof. Michel Valentin; published by *Propos2Editions* in 2009 as a bilingual edition under the title "*Mauvaises Herbes*"

Research Experience

Institute for Systems Biology 2018-present
Washington Research Foundation Distinguished Investigator & Assistant Professor
- Investigate eco-evolutionary processes in host-associated microbial communities
- Characterize how the gut microbiota influences human health and disease
- Develop novel computational and experimental tools for exploring host-microbe systems
- Design targeted strategies for engineering the gut microbiome for improved human health

University of Washington, Departments of Bioengineering & Genome Sciences 2019-present
Affiliate Assistant Professor
- Primary mentor to PhD, Master's, and undergraduate students from the department
- Serve on graduate student committees & participate in student recruitment

eScience Institute 2018-present
Data Science Fellow
- Drive scientific and educational efforts to advance and promote data science in the Seattle research community

Center for Microbiome Science and Therapeutics (CMiST) 2018-present
UW Microbiome Center, Faculty Steering Committee Member
- Provide core wet-lab and bioinformatic services to microbiome researchers in the Seattle area
- Organize internal and external seminar series and symposia

Center for Microbiome Informatics and Therapeutics (CMIT) 2015-2018
MIT Dept. of Biological Engineering and The Broad Institute, Postdoctoral Research Associate
- **Adviser: Prof. Eric Alm**
- Developed analytical/computational workflows for studying the dynamics of microbial populations in the gut.
- Coordinated multidisciplinary team investigating high-resolution eco-evolutionary dynamics of diverse microbial populations in the human gastrointestinal tract
- Designed a series of mouse experiments looking at how combined dietary and antibiotic perturbations influence the structure and stability of the gut microbiome
- Developed a non-parametric approach for correcting batch effects in 'omics data

University of Chicago 2011-2015
Biophysical Sciences PhD Program, Graduate Research Fellow

- **Advisers: Prof. Jack Gilbert and Prof. Maureen Coleman**
- Led a study of marine microbial biogeography, investigating whether or not microbes are dispersal-limited across the globe
- Established and coordinated outside collaborations on the influence of invasive plants on soil microbial communities and on how human land use activities alter river sediment microbial community structure and function
- Developed and carried out a high-throughput bacterial microcosm experiment to test classic ecological theory on how environmental disturbances influence ecological diversity; collaborated with colleagues from the physics department to develop a mathematical formalism for modeling my empirical results
- Worked on several of the first investigations of how the human microbiome interacts with our built environment

Institute for Genomics and Systems Biology 2012-2015
Argonne National Laboratory, Biological Sciences Division, Research Associate

- Adviser: Prof. Jack Gilbert
- Senior data analyst for the Earth Microbiome Project - coordinated collection and analysis of microbial community data from a variety of environments across planet Earth
- Collaborated with researchers from the Knight and Caporaso labs to develop computational tools for processing very large sequencing data sets

Complex Systems Summer School 2014
Santa Fe Institute, Graduate Student

- Team leader on a project that investigated tradeoffs between efficiency and robustness of complex, adaptive systems (i.e. from economics to ecology); report: http://goo.gl/9S4Rmy

MPG Ranch 2010-2011
Molecular Ecology Laboratory, Research Scientist

- Ran the molecular ecology wet-lab at MPG Ranch; supervisors: Dr. Ylva Lekberg & Dr. Philip Ramsey
- Studied the impacts of invasive plant species on grasslands soil microbial communities
- Trained and managed research technicians in DNA extraction, PCR, next-generation sequencing library preparation, bioinformatics, and multivariate statistical analyses

Uppsala University 2009-2010
Fulbright Graduate Research Fellow, Ångström Laboratory, Graduate Student

- Advisers: Prof. Peter Lindblad & Dr. Thorsten Heidorn
- Conducted synthetic biology research geared toward engineering biohydrogen production pathways in cyanobacteria

Environmental and Industrial Microbiology Laboratory
The University of Montana, Laboratory Manager 2008-2009

- Advisers: Prof. James Gannon and Dr. Philip Ramsey
- Managed the Environmental and Industrial Microbiology Laboratory at the University of Montana.
- Trained graduate students and postdocs in wet lab techniques
- Developed wet-lab protocols and conducted independent research on the effects of heavy metals on microbial metabolism and community assembly

The University of Montana, Laboratory Technician 2005-2008

- Adviser: Prof. James Gannon
- Cultured and characterized novel bacterial strains from the Nyack Microbial Observatory in Glacier National Park, cleaned glassware, prepared media, and maintained/repaired equipment

Teaching

ISB Virtual Microbiome Series 2020-present

- Since 2020, our lab has organized an annual microbiome data science course (two days) and research symposium (one day) that is free and accessible to all. These events have been broadly popular across the

microbiome research community. Last year, we had >2200 registrants from >80 countries and 45 U.S. states, and we brought in $10,000 in corporate sponsorships. The YouTube videos from last year's course lectures already have >140,000 views. We pick a new research theme each year and update the course materials to focus on the latest cutting-edge methods. You can access last year's course materials here: https://isbscience.org/microbiome2021/

- In collaboration with Jen Eklund, Christian Diener and I worked to develop our course materials from the ISB Virtual Microbiome Series to train community college instructors to teach data science in their classrooms. We hosted ~12 instructors at ISB in the summer of 2021 and provided them with 80 hours of training. Many of them have integrated these materials into their classrooms. We plan to use their feedback and experiences to develop and online 'train the trainer' course to empower undergraduate instructors from around the world to teach our microbiome course modules.

University of Washington (UW) teaching/service 2019-present

- 2019 - UW eScience Institute: I lectured on batch effects correction methods in microbiome data sets for a data science graduate seminar series
- 2020-2022 - UW Immunology Department: over the past three years I have guest-lectured for Dr. Ram Savan's UW IMM 538 graduate immunology course on how commensal microbiota modulate the host immune system
- 2022 - UW Graduate Nursing Program: I lectured for Dr. Margarite Heitkemper's graduate seminar on the human gut microbiome, health, and disease
- 2019-2022 - Graduate Student Committee Service: I serve on the dissertation committees of several UW PhD students that are not in my lab, including Alex Yuan (Molecular and Cellular Biology Program), David Claussen (Department of Biostatistics), and Evan Pepper (Molecular Engineering Program)
- Over the past four years, I've taken 1-2 graduate rotation students each year from the Department of Bioengineering or the Molecular Engineering Program.
- I serve on the faculty steering committees for the UW Center for Microbiome Science and Therapeutics (CMiST) and for the UW Environmental Health and Microbiome Research Center (EMBRACE).

K-16 education (K-12 + undergraduate) 2018-present

- I have worked with the ISB Education team to develop educational materials for younger students. For example, we wrote a kid-focused primer on fecal transplants for the journal *Frontiers in Young Minds* (doi:10.3389/frym.571389). I have also lectured at middle schools around the Seattle area, including several times at Eckstein Middle School.
- Each summer, my lab takes 1-3 interns through the ISB Summer Internship Program. We have also taken high-school, undergraduate, and graduate interns throughout the year.

Computational Analysis Strategies for the Microbiome Workshop, University of Costa Rica Fall, 2017
Instructor

- Co-taught a week-long graduate workshop on metagenomic and metatranscriptomic data analysis at the University of Costa Rica

ACERA School of Science, Creativity and Leadership, Cambridge, MA Fall, 2016
Visiting Instructor

- Developed microscope-based curriculum for middle school students to learn about mycorrhizal fungi
- Visited the classroom three times: first visit, gave an introductory lecture and then took class outside to collect roots from plants in the playground; second visit, processed, cleared, and stained the roots; third visit, looked at the roots under the microscope and then gave a wrap-up lecture

Chief Dull Knife College, Lame Deer, MT 2010-2014
Adjunct Faculty/Visiting Instructor

- Taught a molecular ecology course to undergraduate students over two semesters; designed curriculum for the classroom and the wet-lab; held office hours
- Coordinated a 2-year student research program to characterize the microbial ecology of Tongue River sediments over a 100 km transect, which resulted in a peer-reviewed publication (i.e., Gibbons et al. 2014).
- Ran seminars and faculty trainings in wet lab techniques and data analysis

Marine Metagenomics Graduate Workshop, Basque Country, Spain Spring, 2014
Erasmus Fellow and Instructor

- Gave a series of lectures on statistical methods for analyzing ecological data

Bioinformatics in Ecology Workshop, Nanjing, China Winter, 2013
Instructor
- Gave a 2-day tutorial on analyzing 16S amplicon data using QIIME

University of Chicago, Chicago, IL Spring 2013
Bioinformatics and Microbial Ecology Graduate Course, Teaching Assistant
- Served as a teaching assistant for a graduate course taught by Prof. Jack Gilbert
- Prepared lecture materials, ran data-analysis mini-workshops, held office hours, graded coursework
- Mentored students who wanted to submit their class projects as publications to peer-reviewed scientific journals

Argonne Soil Metagenomics Conference, Lemont, IL Fall 2012
Teaching Assistant
- Co-taught a bioinformatics workshop geared towards analyzing amplicon sequencing data

University of Chicago, Chicago, IL Spring 2012
Teaching Assistant Training Course
- Took semester-long course designed to train teaching assistants in pedagogy and public speaking
- Designed lesson plans, gave lectures that were recorded and critiqued by faculty and students

The University of Montana, Missoula, MT Fall 2009
Guest Lecturer
- Guest lectured for an upper division undergraduate course on microbial physiology, taught by Prof. James Gannon

The French Ministry of Education, Voiron, France 2004-2005
Instructor
- Taught an English discussion and grammar course at Lycée Ferdinand Buisson
- Designed curriculum and taught classes 5 days a week for 1 year

Recent Publications (2019-2022)

For full list, please see my Google Scholar page: https://scholar.google.com/citations?user=jRChVdYAAAAJ&hl=en

Underscored Text = Gibbons Lab members; * = corresponding author; # = co-first author; selected media coverage, blog posts, and relevant websites included in sub-bullets

Preprints in review

- Lim, J.J., Diener, C., Gibbons, S.M.* 2022. Growth phase estimation for abundant bacterial populations sampled longitudinally from human stool metagenomes. *bioRxiv*, https://doi.org/10.1101/2022.04.23.489288

2022

- Diener, C.#, Dai, C.L.#, Wilmanski, T., Baloni, P., Smith, B., Rappaport, N., Hood, L., Magis, A.T.*, Gibbons, S.M.* 2022. Genome-microbiome interplay provides insight into the determinants of the human blood metabolome. *Nature Metabolism*, https://www.nature.com/articles/s42255-022-00670-1
    - covered by ScienceDaily, ISB News

- Wilmanski, T., Gibbons, S.M.*, Price, N.D.* 2022. Healthy aging and the human gut microbiome: why we cannont just turn back the clock. *Nature Aging*, https://doi.org/10.1038/s43587-022-00294-w

- Gibbons, S.M.*#, Gurry, T.#, Lampe, J.W.#, Chakrabarti, A., Dam, V., Everard, A., Goas, A., Gabriele, G., Kleerebezc, M., Lane, J., Maukonen, J., Penna, A.L.B., Pot, B., Valdes, A.M., Walton, G., Weiss, A., Zanzer,

Y.C., Venlet, N.V.*, Miani, M.* 2022. Perspective: leveraging the gut microbiota to predict personalized responses to dietary, prebiotic, and probiotic interventions. *Advances in Nutrition*, https://doi.org/10.1093/advances/nmac075

- Wilmanski, T., Kornilov, S.A., Diener, C., Conomos, M.P., Lovejoy, J.C., Sebastiani, P., Orwoll, E.S., Hood, L., Price, N.D., Rappaport, N.*, Magis, A.T.*, Gibbons, S.M.* 2022. Heterogeneity in statin responses explained by variation in the human gut microbiome. *Med*, https://doi.org/10.1016/j.medj.2022.04.007
    - Covered by: ISB News, Science Daily, and Medical News Today

2021

- Diener, C.*, Qin, S., Zhou, Y., Patwardhan, S., Tang, L., Lovejoy, J. Magis, A.T., Price, N.D., Hood, L., Gibbons, S.M.* 2021. Baseline gut metagenomic functional gene signature associated with variable weight loss responses following a healthy lifestyle intervention in humans. *mSystems,* e009624-21, https://doi.org/10.1128/mSystems.00964-21
    - Covered by: ISB News, Medical News Today, Geekwire, ScienceDaily
- Kordahi, M.C., Stanaway, I.B., Avril, M., Chac, D., Blanc, M., Ross, B., Diener, C., Jain, S., McCleary, P., Parker, A., Friedman, V., Huang, J., Burke, W., Gibbons, S.M., Willis, A.D., Darveau, R.P., Grady, W.M., Ko, C.W., DePaolo, R.W.* 2021. Genomic and functional characterization of a mucosal symbiont involved in early-stage colorectal cancer. *Cell Host & Microbe*, https://doi.org/10.1016/j.chom.2021.08.013
    - Covered by: UW Newsroom
- Wilmanski, T., Rappaport, N., Diener, C., Gibbons, S.M.*, Price, N.D.* 2021. From taxonomy to metabolic output: what factors define gut microbiome health? *Gut Microbes*, 13:1, 1-20, DOI: 10.1080/19490976.2021.1907270
- Groussin, M.#*, Poyet, M.#*, Sistiaga, A., Kearney, S.M., Moniz, K., Noel, M., Hooker, J., Gibbons, S.M., Segurel, L., Froment, A., Mohamed, R.S., Fezeu, A., Juimo, V.A., Lafosse, S., Tabe, F.E., Girard, C., Iqaluk, D., Nguyen, L.T.T., Shapiro, B.J., Lehtimäki, J.M.S., Ruokolainen, L., Kettunen, P.P., Vatanen, T., Sigwazi, S., Mabulla, A., Domínguez-Rodrigo, M., Nartey, Y.A., Agyei-Nkansah, A., Duah, A., Awuku, Y.A., Valles, K.A., Asibey, S.O., Afihene, M.Y., Roberts, L.R., Plymoth, A., Onyekwere, C.A., Summons, R.E., Xavier, R.J., and Alm, E.J.* 2021. Elevated rates of horizontal gene transfer in the industrialized human microbiome. *Cell*, https://doi.org/10.1016/j.cell.2021.02.052
    - Covered by The Scientist and MIT News
- Diener, C.#, Hoge, A.C.H.#, Kearney, S.M., Kusebauch, U., Patwardhan, S., Moritz, R.L., Erdman, S.E., Gibbons, S.M.* 2021. Non-responder phenotype reveals apparent microbiome-wide antibiotic tolerance in the murine gut. *Communications Biology*, 4(316), https://doi.org/10.1038/s42003-021-01841-8
    - Behind the Paper blog post
- Wilmanski, T., Diener, C., Rappaport, N., Patwardhan, S., Wiedrick, J., Lapidus, J., Earls, J.C., Zimmer, A., Glusman, G., Robinson, M., Yurkovich, J.T., Kado, D.M., Cauley, J.A., Zmuda, J., Lane, N.E., Magis, A.T., Lovejoy, J.C., Hood, L., Gibbons, S.M.*, Orwoll, E.*, Price, N.D.* 2021. Gut microbiome pattern reflects healthy ageing and predicts survival in humans. *Nature Metabolism*, https://doi.org/10.1038/s42255-021-00348-0
    - Hear lead author Dr. Tomasz Wilmanski discuss these results on the Closer to the Phenotype podcast
    - covered by the New York Times, ISB News, and Science Daily
- Day, J.A.#, Diener, C.#, Otwell, A.E.#, Tams, K.E., Bebout, B., Detweiler, A.M., Lee, M,D., Scott, M.T., Ta, W., Ha, M., Carreon, S.A., Tong, K., Ali, A.A., Gibbons, S.M.*, Baliga, N.S.* 2021. Lettuce (*Lactuca sativa*) productivity influenced by microbial inocula under nitrogen-limited conditions in aquaponics. *PLoS ONE* 16(2): e0247534. https://doi.org/10.1371/journal.pone.0247534

- Zimmer, A., Korem, Y., Rappaport, N., Wilmanski, T., Baloni, P., Jade, K., Robinson, M., Magis, A.T., Lovejoy, J., Gibbons, S.M., Hood, L.*, Price, N.D.* 2021. The geometry of clinical labs and wellness states from deeply phenotypes humans. *Nature Communications,* 12:3578 https://doi.org/10.1038/s41467-021-23849-8
- Graham, E.B., Averill, C., Bond-Lamberty, B., Knelman, J.E., Krause, S., Peralta, A.L., Shade, A., Smith, A.P., Cheng, S.J., Fanin, N., Freund, C., Garcia, P.E., Gibbons, S.M., Van Goethem, M.W., Guebila, M.B., Kemppinen, J., Nowicki, R.J., Pausas, J.G., Reed, S.P., Rocca, J., Sengupta, A., Sihi, D., Simonin, M., Słowiński, M., Spawn, S.A., Sutherland, I., Tonkin, J.D., Wisnoski, N.I., Zipper, S.C. and Contributor Consortium. 2021. Toward a Generalizable Framework of Disturbance Ecology Through Crowdsourced Science. *Frontiers in Ecology and Evolution* 9:588940. doi: 10.3389/fevo.2021.588940. https://doi.org/10.3389/fevo.2021.588940
- Vangay, P., Burgin, J., Johnston, A., Beck, K.L., Berrios, D.C., Blumberg, K., Canon, S., Chain, P., Chandonia, J.M., Christianson, D., Costes, S.V., Damerow, J., Duncan, W.D., Dundore-Arias, J.P., Fagnan, K., Galazka, J.M. Gibbons, S.M., Hays, D., Hervey, J., Hu, B., Hurwitz, B.L., Jaiswal, P., Joachimiak, M.P., Kinkel, L., Ladau, J., Martin, S.L., McCue, L.A., Miller, K., Mouncey, N., Mungall, C., Pafilis, E., Reddy, T.B.K., Richardson, L., Roux, S., Shaffer, J.P., Sundaramurthi, J.C., Thompson, L.R., Timme, R.E., Zheng, J., Wood-Charlson, E.M., and Eloe-Fadrosh, E.A. 2021. Microbiome Metadata Standards: Report of the National Microbiome Data Collaborative's Workshop and Follow-On Activities. *mSystems*, 6:e01194-20; doi:10.1128/mSystems.01194-20 http://msystems.asm.org/content/6/1/e01194-20.abstract

- Otwell, A.E.#, Carr, A.V.#, Majumder, E.L.W., Ruiz, M.K., Wilpiszeski, R.L., Hoang, L.T., Webb, B., Turkarslan, S., Gibbons, S.M., Elias, D.A., Stahl, D.A., Siuzdak, G., Baliga, N.S.* 2021. Sulfur metabolites play key system-level roles in modulating denitrification. *mSystems* 6:e01025-20. https://doi.org/10.1128/mSystems.01025-20.
- Patwardhan, S., Diener, C., Swegle, S., Howsmon, B., Gibbons, S.M.* 2021. What are poop transplants and how do they work? *Frontiers for Young Minds*, 9:571389. doi:10.3389/frym.571389

2020

- Manor, O.#*, Dai, C.L.#, Kornilov, S., Smith, B., Price, N.D., Lovejoy, J.C., Gibbons, S.M., Magis, A.T. 2020. Health and disease markers correlate with gut microbiome composition across thousands of people. *Nature Communications*, 11, 5206, https://doi.org/10.1038/s41467-020-18871-1
    - covered by ISB News
- Gibbons., S.M.* 2020. Keystone taxa indispensable for microbiome recovery. *Nature Microbiology*, 5, 1067–1068. https://doi.org/10.1038/s41564-020-0783-0
    - ReadCube link rdcu.be/b6qCm
- Levy, R., Magis, A.T., Earls, J.C., Manor, O., Wilmanski, T., Lovejoy, J., Gibbons, S.M., Omenn, G.S., Hood, L.*, Price, N.D.* 2020. Longitudinal analysis reveals transition barriers between dominant ecological states in the gut microbiome. *Proceedings of the National Academy of Sciences USA*, https://doi.org/10.1073/pnas.1922498117
    - covered by ISB News
- Diener, C., Gibbons, S.M.*, Resendis-Antonio, O.* 2020. MICOM: metagenome-scale modeling to infer metabolic interactions in the gut microbiota. *mSystems,* https://journals.asm.org/doi/10.1128/mSystems.00606-19
    - covered by ISB News
    - MICOM website

2019

- Gibbons, S.M.* 2019. Defining microbiome health through a host lens. *mSystems.* *https://doi.org/10.1128/mSystems.00155-19*

- Wilmanski, T.#, Rappaport, N.#, Earls, J.C., Magis, A.T., Manor, O., Lovejoy, J., Omenn, G.S., Hood, L.*, Gibbons, S.M.*, Price, N.D.* 2019. Blood metabolome predicts gut microbiome alpha-diversity in humans. *Nature Biotechnology*, https://doi.org/10.1038/s41587-019-0233-9

    - covered by GeekWire, The Record on KUOW, and ISB News

    - Nature Bioengineering Community blog post, Metabolon blog post

- Poyet, M.#, Groussin, M.#, Gibbons, S.M.#, Avila-Pacheco, J., Jiang, X., Kearney, S.M., Perrotta, A.R., Berdy, B., Zhao, S., Lieberman, T., Swanson, P.K., Smith, M., Roesemann, S., Alexander, J.E., Rich, S.A., Livny, J., Vlamakis, H., Clish, C., Bullock, K., Deik, A., Scott, J., Pierce, K.A., Xavier, R.*, and Alm, E.J.* 2019. A library of human gut bacterial isolates paired with longitudinal multiomics data enables mechanistic microbiome research. *Nature Medicine,* https://doi.org/10.1038/s41591-019-0559-3

    - covered by ScienceDaily and MIT News

- Bolyen, E., Rideout, J.R., Dillon, M.R., Bokulich, N.A., Abnet, C.C., Al-Ghalith, G.A., Alexander, H., Alm, E.J., Arumugam, M., Asnicar, F., Bai, Y., Bisanz, J.E., Bittinger, K., Brejnrod, A., Brislawn, C.J.,Brown, C.T., Callahan, B.J., Caraballo-Rodríguez, A.M., Chase, J., Cope, E.K., Da Silva, R., Diener, C., Dorrestein, P.C., Douglas, G.M., Durall, D.M., Duvallet, C., Edwardson, C.F., Ernst, M., Estaki, M., Fouquier, J., Gauglitz, J.M., Gibbons, S.M., Gibson, D.L., Gonzalez, A., Gorlick, K., Guo, J., Hillmann, B., Holmes, S., Holste, H., Huttenhower, C., Huttley, G.A., Janssen, S., Jarmusch, A.K., Jiang, L., Kaehler, B.D., Kang, K.B., Keefe, C.R., Keim, P., Kelley, S.T., Knights, D., Koester, I., Kosciolek, T., Kreps, J., Langille, M.G. I., Lee, J., Ley, R., Liu, Y., Loftfield, E., Lozupone, C., Maher, M., Marotz, C., Martin, B.D., McDonald, D., McIver, L.J., Melnik, A.V., Metcalf, J.L., Morgan, S.C., Morton, J.T., Naimey, A.T., Navas-Molina, J.A., Nothias, L.F., Orchanian, S.B.,Pearson, T., Peoples, S.L., Petras, D., Preuss, M.L., Pruesse, E., Rasmussen, L.B., Rivers, A., Robeson, M.S., Rosenthal, P., Segata, N., Shaffer, M., Shiffer, A., Sinha, R., Song, S.J., Spear, J.R., Swafford, A.D., Thompson, L.R., Torres, P.J., Trinh, P., Tripathi, A., Turnbaugh, P.J., Ul-Hasan, S., van der Hooft, J.J.J., Vargas, F., Vázquez-Baeza, Y., Vogtmann, E., von Hippel, M., Walters, W., Wan, Y., Wang, M., Warren, J., Weber, K.C., Williamson, C.H.D., Willis, A.D., Xu, Z.Z., Zaneveld, J.R., Zhang, Y., Zhu, Q., Knight, R., and Caporaso, J.G.* 2019. Reproducible, interactive, scalable and extensible microbiome data science using QIIME 2. *Nature Biotechnology*, https://doi.org/10.1038/s41587-019-0209-9

- Xiang, X., Gibbons, S.M., Li, H., Shen, H., and Chu, H.* 2019. Proximate grassland and shrub-encroached sites show dramatic restructuring of soil bacterial communities. *PeerJ,* doi 10.7717/peerj.7304

- Carr, A., Diener, C., Baliga, N.S.*, and Gibbons, S.M.* 2019. Use and abuse of correlation analyses in microbial ecology. *ISME Journal*, https://doi.org/10.1038/s41396-019-0459-z

    - Blog Post

- Zhao, S.#, Lieberman, T.D.#*, Poyet, M., Groussin, M., Gibbons, S.M., Xavier, R.J., Alm, E.J.* 2019. Adaptive evolution within gut microbiomes of healthy people. *Cell Host & Microbe*. https://doi.org/10.1016/j.chom.2019.03.007

    - Covered by Science Daily

- Rocca, J.D.*, Simonin, M.*, Blaszczak, J.R., Ernakovich, J.G., Gibbons, S.M., Midani, F.S., Washburne, A.D. 2019. The Microbiome Stress Project: towards a global meta-analysis of environmental stressors and their effects on microbial communities. *Frontiers in Microbiology*. doi: 10.3389/fmicb.2018.03272

Selected Presentations

1. Gibbons, S.M. 2022. Community-scale metabolic modeling enables precision engineering of gut microbiome functional outputs. Invited Talk. SymbNET Symposium on Microbiome Metabolomics, Kiel University
2. Gibbons, S.M. 2022. Microbial community-scale metabolic modeling enables rational engineering of ecosystem functional outputs. Invited Seminar. Institute for Ecology and Evolution, University of Oregon (https://youtu.be/AqbVSq6ob-0)
3. Gibbons, S.M. 2022. Community-scale metabolic modeling of the gut microbiome enables rational engineering of prebiotic, probiotic, and dietary interventions. Invited Seminar. NIDDK P30 Center for Molecular Studies in Digestive Diseases, University of Pennsylvania
4. Gibbons, S.M. 2022. Engineering the gut microbiome to improve human health. Combi Seminar, Genome Sciences Department, University of Washington, Invited Talk
5. Gibbons, S.M. 2022. The human gut microbiome as a modifier of responses to interventions. Arizona State University Biodesign Center, Tempe, Arizona, Invited Talk
6. Gibbons, S.M. 2022. Recent progress towards microbiome-informed precision medicine. Penn State Microbiome Center, Invited Talk
7. Gibbons, S.M. 2022. Seeing the reflection of the human gut microbiome in the bloodstream. Frontiers in Microbiome Research Summer Coarse, Ebberup, Denmark, Keynote Talk
8. Gibbons, S.M. 2022. Reflections of the gut microbiome in blood. University of Copenhagen, Invited Talk
9. Gibbons, S.M. 2022. Leveraging the microbiome to predict personalized responses to dietary, prebiotic, and probiotic interventions. International Probiotics Conference, Bratislava, Slovakia, Invited Talk
10. Gibbons, S.M. 2021. Seeing reflections of the gut microbiome in blood metabolites. Arizona State University and University of Washington joint symposium on the human microbiome, Invited Talk
11. Gibbons, S.M. 2021. Listening in on the metabolic cross-talk between our commensal microbiota and our bodies. Korean Microbiology Society Symposium, Seoul, Korea, Invited Talk
12. Gibbons, S.M. 2021. Towards rational engineering of gut microbiome metabolic outputs. Microbiome Movement Drug Development Conference, Boston, MA, Invited Talk
13. Gibbons, S.M. 2021. APS-DBIO living histories. Division of Biological Physics, American Physics Society, Division of Biological Physics, Invited Talk
14. Gibbons, S.M. 2021. Human gut microbiome signature reflects healthy aging and predicts survival in the latest decades of life. Targeting Microbiota Conference, Paris, France, Invited Talk
15. Gibbons, S.M. 2020. Reflections of the gut microbiome in the host metabolome. Virtual Podium Seminar on the Microbiome, Invited Talk (https://youtu.be/VFDiYzlkyFk)
16. Gibbons, S.M. 2020. Reflections of the gut microbiome in host molecular phenotypes in health and disease. Virtual Seminar, American Society of Nutrition 2020 Meeting, Invited Talk
17. Gibbons, S.M. 2020. Reflections of the gut microbiota in blood. MicroSeminar, Invited Talk (https://www.youtube.com/watch?v=nRO9YLcO_q4)
18. Gibbons, S.M. 2020. Seeing microbiome 'health' through a host lens. MIT Microbiome Club Seminar, Invited Talk
19. Gibbons, S.M. 2019. Defining gut dysbiosis through cross-disease meta-analysis. Colorectal Cancer and the Gut Microbiome Symposium, Fred Hutch Cancer Research Institute, Seattle, WA, Invited Talk

20. Gibbons, S.M. 2019. Defining microbiome health through a host lens: relating ecological diversity in the gut to disease. Vaccine and Infectious Disease Division Seminar Series, Fred Hutch Cancer Research Institute, Seattle, WA, Invited Talk
21. Gibbons, S.M. 2019. The gut microbiome: a newly recognized organ of the human body. Biological Sciences Department, Florida Atlantic University, Boca Raton, FL, Invited Talk
22. Gibbons, S.M. 2019. Near-causal inference in multi-omic time series. Data Science Symposium, eScience Institute, University of Washington, Seattle, WA, Invited Talk
23. Gibbons, S.M. 2019. Non-responder phenotypes reveal microbiome-wide antibiotic tolerance in the murine gut. American Society for Microbiology Microbe Conference, San Francisco, CA, Invited Talk
24. Gibbons, S.M. 2019. Harnessing our inner ecology to treat disease. National Academy of Sciences, Science Documentary Filmmaker Retreat, Woods Hole, MA, Invited Talk
25. Gibbons, S.M. 2019. Integration of genome-scale metabolic models with amplicon or shotgun sequencing data. American Associations for Dental Research Fall Focused Symposium on the Oral Microbiome, J. Craig Venter Institute, San Diego, CA, Invited Talk
26. Gibbons, S.M. 2019. When the weeds invade: the human gut microbiome and infectious disease risk. European Scientific Conference on Applied Infectious Disease Epidemiology, Stockholm, Sweden, Plenary Talk (https://youtu.be/7_UkfFT3io4)
27. Gibbons, S.M. 2018. How do we model dynamics in the human gut? Center for Modeling Complex Interactions, University of Idaho, Moscow, ID, Invited Seminar
28. Gibbons, S.M. 2018. Personalized eco-evolutionary dynamics in the human gut. Microbiome Research Initiative, Fred Hutch Cancer Research Institute, Seattle, WA, Invited Talk
29. Gibbons, S.M. 2018. Bimodal response of murine gut microbiota to beta-lactam antibiotic. Center for Microbiome Science and Therapeutics Symposium, University of Washington, Seattle, WA, Invited Talk
30. Gibbons, S.M. 2018. How do we model dynamics in the human gut? Genomic Sciences Program, University of Washington, Seattle, WA, Invited Talk
31. Gibbons, S.M. 2018. Personalized eco-evolutionary dynamics in the human gut microbiome. Flatiron Institute, Center for Computational Biology, Simons Foundation, New York, NY, Invited Talk
32. Gibbons, S.M. 2018. Individual-specific eco-evolutionary dynamics in the human gut. Invited Talk, Biophysics Seminar Series, University of Chicago, Chicago, IL
33. Gibbons, S.M. 2017. Determinants of resilience in microbial communities. Invited Talk, Institute for Systems Biology, Seattle, WA
34. Gibbons, S.M. 2017. Individual-specific eco-evolutionary dynamics in the human gut. Invited Talk, Center for the Study of Inflammatory Bowel Disease Annual Symposium, Massachusetts General Hospital, Boston, MA
35. Gibbons, S.M. 2017. Two dynamic regimes in the human gut microbiome? Invited Talk, Ecological Society of America Conference, Portland, OR
36. Gibbons, S.M. 2017. How do we model microbial dynamics in the gut? Invited Talk, Channing Network Division Seminar, Harvard Medical School, Cambridge, MA
37. Gibbons, S.M. 2017. Microbial systems as quantitative models for understanding ecological resilience. Invited Talk, UCLA Ecology and Evolution Dept. Seminar, Los Angeles, CA
38. Gibbons, S.M. 2016. The ecology of the human gut microbiome in health and disease. Invited Talk, Whitehead Institute Teacher Program Seminar, Cambridge, MA
39. Gibbons, S.M. 2015. Protein expression levels constrain evolutionary trajectories during genome streamlining. Invited Talk, Microbial Systems Seminar, MIT, Cambridge, MA
40. Gibbons, S.M. 2015. The search for microbes. Invited Talk, Biological Sciences Division Graduate Student Seminar, University of Chicago
41. Gibbons, S.M. 2014. The Intermediate Disturbance Hypothesis: why should diversity peak at intermediate disturbance? Invited Talk, Natural History Seminar, University of Chicago, Dept. of Ecology and Evolution, Chicago, IL
42. Gibbons, S.M. 2013. The Earth Microbiome Project: Planetary-scale systems ecology. Invited talk, TDWG Biodiversity and Informatics Standards Conference, Florence, Italy
43. Gibbons, S.M. 2013. The Earth Microbiome Project: Planetary-scale systems ecology. Invited lecture, Genome Science Symposium. Tokyo, Japan

Awards, Scholarships, and Fellowships

2022 Puget Sound Business Journal Health Care Leadership Award
2018 Washington Research Foundation Distinguished Investigator
2016 Department of Energy ENIGMA Discovery Grant
2014 Erasmus Mundus Scholarship for Visiting Scholars (University of the Basque Country, Spain)
2014 University of Chicago Graduate Student Council Travel Award
2013 University of Chicago Biological Sciences Division Student Travel Grant
2013 Travel Grant for the International Thünen Symposium on Soil Metagenomics
2012 EPA STAR Graduate Fellowship (3 years; tuition, stipend, and research expenses)
2012 Amazon Web Services Education Grant
2010 Fulbright Graduate Fellowship (1 year of support to study abroad)
2008 University of Montana Top Graduating Senior in Microbiology and French Departments
2008 University of Montana Student Service Award for Distinguished Service & Achievement
2007 HHMI MILES Honors Research Fellow
2007 Julius and Anna Wiegenstein Scholarship for Microbiology
2007 Jestrab-Chaffee Scholarship for Academic Excellence
2007 Top Life Science Poster Presentation at the UM Undergraduate Research Conference
2007 National SMART Grant
2006 Davidson Honors College Undergraduate Research Award
2006 Adrian and Sally Walker Scholarship for Financial Need, Community Service, and Academics
2006 Leslie Sheridan Alumni Scholarship for Deserving Science Majors
2005 McGee, Rose Southworth Scholarship for Deserving Students Majoring in a Foreign Language
2005 Robert M. Burgess Memorial Scholarship for Promising Undergraduates Majoring in the Humanities
2005 Montana Baker Grant for Low-Income Montanans
2003 Bonhomme Scholarship for Academic Excellence
2002 Fox Foundation Scholarship for Promising High School Graduates

Service and Outreach

Scientific Societies

- American Society for Microbiology (ASM)
    - Member
    - Editor for ASM journal *mSystems*
    - Session organizer for the annual ASM Microbe conference
- American Physics Society (APS)
    - Member of the Division of Biological Physics
- American Society for Nutrition (ASN)
    - Member

Peer Review Duties

- Each year, I sit on NIH, DOE, and DOJ grant review panels.
- I review 2-3 manuscripts each month for a number of academic journals, including *Nature Microbiology*, *Nature Biotechnology*, *Nature Metabolism*, *Nature Aging*, *Nature Medicine*, *Nature Communications*, *Nature Ecology & Evolution*, *Cell Host & Microbe*, *Cell Reports*, *mSystems*, *eLife*, *ISME Journal*, *Applied and Environmental Microbiology*, and *PLoS Computational Biology*

Public outreach

- I have participated in a number of public-facing events designed to communicate our science to lay audiences, including a 2018 Facebook AMA on the human microbiome (https://youtu.be/Xd87o_wBzDE), a 2020 Seattle Town Hall event on the tracking the pandemic through wastewater monitoring with Dr. Eric Alm (https://youtu.be/eU9womxXWYY), a 2021 Seattle Town Hall event on the state of the microbiome field with Dr. Jack Gilbert (https://youtu.be/3sSPX2M2Uoc), and ISB Research Roundtable events on personalized nutrition (https://youtu.be/Hl4JyILiM7k) and on microbiome-informed precision statin treatment (https://youtu.be/bT4nEMru8lI).

Mentorship

Current Lab Members

- Dr. Christian Diener (https://gibbons.isbscience.org/bio/christian-diener/), Research Scientist (originally hired as a postdoc), July 2018 - present
- Alex Carr (https://gibbons.isbscience.org/bio/alex-carr/), PhD Student (co-advised with Nitin Baliga), UW Molecular Engineering Program, June 2018-present
- Nick Bohmann (https://gibbons.isbscience.org/bio/nick-bohmann/), PhD Student, UW Molecular Engineering Program, June 2020-present
- James Johnson (https://gibbons.isbscience.org/bio/james-johnson/), PhD Student, UW Dept. of Bioengineering, January 2020-present
- Dr. Annie Levine (https://gibbons.isbscience.org/bio/annie-levine/), Clinical Research Fellow, Seattle Children's Hospital, January 2022-present
- Kat Ramos Sarmiento (https://gibbons.isbscience.org/bio/kat-ramos-sarmiento/), Research Associate, October 2022-present

Lab Alumni

- Dr. Sushmita Patwardhan (https://gibbons.isbscience.org/bio/sushmita-patwardhan/), Postdoctoral Fellow, October 2018-February 2020, Current Position: Medical Science Writer at Precisionscientia
- Anna Hughes Hoge (https://gibbons.isbscience.org/bio/anna-hoge/), Undergraduate Summer Intern, June-August 2018, Medical School Student at Mayo Clinic
- Conner Hyde (https://gibbons.isbscience.org/bio/conner-hyde/), High School Intern, Gibson Ek High School, November 2018-May 2020, Applying for Colleges
- Amanda Holmes (https://gibbons.isbscience.org/bio/amanda-holmes/), Masters Student, UW School of Public Health, December 2018-May 2019, Current Position: Clinical and Translational Research Professional at Seattle Children's Hospital
- Sandra Oluoch (https://gibbons.isbscience.org/bio/sandra-oluoch/), Graduate Intern (co-advised with the Health Data Science Lab), UW Dept. of Bioengineering, June-August 2020, Current Position: Scientific Data Engineer at the Allen Institute for Cell Science
- Vasuprada Shandar (https://gibbons.isbscience.org/bio/vasuprada-shandar/), High School Intern, Interlake High School, April 2019-August 2019 and June 2020-present, Current Position: Undergraduate Student at the University of Pennsylvania
- Eric Tran (https://gibbons.isbscience.org/bio/eric-tran/), Undergraduate Intern, UW Microbiology, March 2019-August 2020, Current Position: Analyst at Optimum Healthcare
- Ariana Haidari (https://gibbons.isbscience.org/bio/ariana-haidari/), Graduate Intern, Dartmouth University Master's in Epidemiology, June-August 2021, Current Position: PhD Student at the University of Michigan
- Vyshnika Sriskantharajah (https://gibbons.isbscience.org/bio/vyshnika-sriskantharajah/), Graduate Intern (co-advised with Hadlock Lab), UW Master's in Health Informatics, January-September 2021, Applying to Graduate Programs
- Dr. Alexander Manhert (https://gibbons.isbscience.org/bio/alexander-mahnert/), Visiting Scholar, Medical University of Graz (Austria), June 2022-July 2022

- Stephanie Swegle (https://gibbons.isbscience.org/bio/stephanie-swegle/), Undergraduate Intern (mentored by Christian Diener), May 2022-August 2022
- Arden Lee (https://gibbons.isbscience.org/bio/arden-lee/), Undergraduate Intern (mentored by Christian Diener), May 2022-August 2022
- Pooja Thorali (https://gibbons.isbscience.org/bio/pooja-thorali/), Undergraduate Intern (mentored by Nick Bohmann), June 2022-September 2022

Research Support

Current

- Source: Washington Research Foundation – WRF Distinguished Investigator
  Project period: 6/1/2018-5/31/2023
  Total award: $1.4 million

- Source: NIH R01 – Principal Investigator (PI)
  Project period: 7/1/2022-4/30/2027
  Total award: $3.2 million

- Source: NIH R01 Subaward from SCRI
  Project period: 04/1/2022 – 3/31/2027
  Total award: $0.6 million

Other Pending

- Source: NIH R01 Subaward from BWH
  Project period: 12/1/22 – 11/30/2027
  JIT total award: $0.2 million

- Source: NIH R01 Subaward from BWH
  Project period: 4/1/2023 – 3/31/2028
  Proposed award: $0.7 million

- Source: NIH R01 Subaward from UW
  Project period: 12/1/2022 – 11/30/2025
  Proposed award: $0.8 million

- Source: NIH R01 Subaward from SCRI
  Project period: 9/1/2022 – 8/31/2025
  Proposed award: $0.1 million

- Source: NIH R01 Subaward from BWH
  Project period: 12/1/2022 – 11/30/2027
  Proposed award: $0.2 million

- Source: Bill & Melinda Gates Foundation – PI
  Project Period: 2/1/2023 – 5/31/2026
  Proposed award: $0.7 million

Funded Collaborations

- Project Title: *CyberGut: towards personalized human-microbiome metabolic modeling for precision health and nutrition.*
  Collaborators: Dr. Johanna Lampe (Fred Hutchinson Cancer Research Institute); Dr. Pieter Dorrestein (UCSD); Dr. Priyanka Baloni (Purdue University)
  Funder: NIH NIDDK
- Project Title: *Bifidobacterium infantis supplementation in early life to improve immunity in infants exposed to HIV: a randomized, placebo-controlled, double-blind trial.*
  Collaborators: Dr. Heather Jaspan (Seattle Children's Hospital); Dr. Clive Gray (University of Cape Town); Dr. Anna Happel (University of Cape Town)
  Funder: NIH NICHD
- Project Title: *Understanding mechanisms underlying intergenerational obesity: The LIPP follow-up study.*
  Collaborators: Dr. Sarbattama Sen (Brigham and Women's Hospital); Dr. Patrick Catalano (Tufts University Medical Center); Dr. Camilia Martin (Cornell University); Dr. Marie-France Hivert (Harvard Medical School)
  Funder: NIH NICHD
- Project Title: *Healthy aging and the human gut microbiome.*
  Collaborators: Dr. Nathan Price (Institute for Systems Biology), Dr. Leroy Hood (Institute for Systems Biology), Dr. Noa Rappaport (Institute for Systems Biology), Dr. Eric Orwoll (Oregon Health Sciences University)
  Funder: National Academy of Medicine