Roland Hatzenpichler, PhD

Montana State University • 111 Chemistry & Biochemistry Bldg • PO Box 173400 • Bozeman MT-59717
roland.hatzenpichler@montana.edu • www.environmental-microbiology.com • ORCID 0000-0002-5489-3444

Professional Preparation

- 2011-2016, Postdoctoral Scholar, California Institute of Technology, Geological and Planetary Sciences, Pasadena, CA
- 2011, Doctor of Natural Sciences (PhD), Microbial Ecology, University of Vienna, Austria
- 2006, Master of Natural Sciences, Molecular Microbiology and Genetics, University of Vienna, Austria

Appointments

- **Nov 2016 - present, Assistant Professor, Department of Chemistry and Biochemistry. Montana State University (MSU), Bozeman**
- Aug 2017 - present, Affiliated faculty at Thermal Biology Institute, MSU
- Aug 2016 - present, Affiliated faculty at Center for Biofilm Engineering, MSU
- Aug-Oct 2016, Assistant Research Professor, Department of Microbiology and Immunology, MSU

Awards and honors

- **2017, NASA Early Career Fellowship**
- 2014, NSF Center for Dark Energy Biosphere Investigations Postdoctoral Scholarship
- 2011, O.K. Earl Postdoctoral Scholarship in Geobiology, California Institute of Technology
- 2011, Erwin Schrödinger Postdoctoral Scholarship, Austrian Science Fund
- 2011, Award for outstanding PhD thesis by the City of Vienna and the University of Vienna
- 2007, Pre-doctoral Fellowship by the Austrian Academy of Sciences

Peer reviewed publications: 25 total **2 manuscripts in review**
***corresponding** **equal contribution** **~3,000 citations, h-index 16, i10 index 16**

21. Wang Q, Alowaifeer A, Kerner P, Balasubramanian N, Patterson A, Christian W, Tarver A, Dore JE, **Hatzenpichler R**, Bothner BB, McDermott TR. *Aerobic bacterial methane synthesis*. Proc Natl Acad Sci USA, accepted (2021)

20. Reichart NJ, Bowers RM, Woyke T, **Hatzenpichler R***. *High potential for biomass-degrading enzymes revealed by hot spring metagenomics*. Front Microbiol, 12: 668238 (2021) PDF

19. Nayfach S, Roux S, Seshadri R, Udwary D, Varghese N, Schulz F, Wu D, Paez-Espino D, Chen IM, Huntemann M, Palaniappan K, Ladau J, Mukherjee S, Reddy TBK, Nielsen T, Kirton E, Faria JP, Edirisinghe JN, Henry CS, Jungbluth SP, Chivian D, Dehal P, Wood-Charlson EM, Arkin AP, Tringe SG, Visel A, **IMG/M Data Consortium**, Woyke T, Mouncey NJ, Ivanova NN, Kyrpides NC, Eloe-Fadrosh EA. *A genomic catalog of Earth's microbiomes*. Nat Biotech, DOI:10.1038/s41587-020-0718-6 (2020) PDF

18. Reichart NJ, Jay ZJ, Krukenberg V, Parker AE, Spietz RL, **Hatzenpichler R***. *Activity-based cell sorting reveals responses of uncultured archaea and bacteria to substrate amendment.* The ISME J, 14: 2851–2861 (2020) PDF

17. Murray AE, Freudenstein J, Gribaldo S, **Hatzenpichler R**, Hedlund BP, Hugenholtz P, et al. *Roadmap for naming uncultivated archaea and bacteria.* Nat Microbiol, 5: 987–994 (2020) PDF

16. Steward KF, Eilers B, Trippett B, Fuchs A, Dorle M, Rawle R, Soriano B**,** Balasubramanian N, Copié V, Bothner B*, **Hatzenpichler R*.** *Metabolic Implications of Using BioOrthogonal Non-Canonical Amino Acid Tagging (BONCAT) for Tracking Protein Synthesis*. Front Microbiol, 11:197 (2020) PDF

15. **Hatzenpichler R***, Krukenberg V, Spietz RL, Jay ZJ. *Next-generation physiology approaches to study microbiome function at the single cell level*. Nat Rev Microbiol, 18: 241-256 (2020) PDF

► Cover article ► Review article ►Faculty1000 recommended

14. Lawson CE, Harcombe WR, **Hatzenpichler R,** Lindemann SR, Löffler F, O'Malley MA, García-Martin H, Pfleger BF, Raskin L, Venturelli OS, Weissbrodt DG, Noguera DR, McMahon KD. *Common principles and best practices for engineering microbiomes*. Nat Rev Microbiol, 17: 725–741 (2019) PDF ► **Perspective article**

13. McKay LJ, **Hatzenpichler R**, Inskeep WP, Fields MW. *Occurrence and expression of novel methyl-coenzyme M reductase gene (mcrA) variants in hot spring sediments*. Sci Rep 7: 7252 (2017) PDF

12. Miranda PJ, McLain NK, **Hatzenpichler R**, Orphan VJ, and Dillon J. *Characterization of chemosynthetic microbial mats associated with intertidal hydrothermal sulfur vents in White Point, San Pedro, CA, USA*. Front Microbiol, 7:1163 (2016) PDF

11. **Hatzenpichler R***, Connon SA, Goudeau D, Malmstrom R, Woyke T, Orphan VJ*. *Visualizing in situ translational activity for identifying and sorting slow-growing archaeal-bacterial consortia.* Proc Natl Acad Sci USA, 113: E4069-E4078 (2016) PDF
► **Highlighted by Nat Microbiol "News & Views"**

10. Tavormina PL, **Hatzenpichler R**, McGlynn S, Chadwick G, Dawson K, Connon S, and Orphan VJ. *Methyloprofundus sedimenti gen. nov., sp. nov., an obligate methanotroph from ocean sediment belonging to the Deep Sea 1 clade of marine methanotrophs*. Int J Syst Evo Microbiol, 65: 251–259 (2015) PDF

9. **Hatzenpichler R***, Scheller S, Tavormina PL, Babin B, Tirrell D, and Orphan VJ*. *In situ visualization of newly synthesized proteins in environmental microbes using amino acid tagging and click chemistry*. Environ Microbiol, 16: 2568-2590 (2014) PDF
► **Cover article** ► **Highlighted by Environ Microbiol "Research Highlight"**

8. Ma L, Kim J, **Hatzenpichler R**, Karymov MA, Hubert N, Hanan IM, Chang EB, and Ismagilov RF. *Gene-targeted microfluidic cultivation validated by isolation of a gut bacterium listed in Human Microbiome Project's Most Wanted taxa*. Proc Natl Acad Sci USA, 111: 9768–9773 (2014) PDF

7. Lebedeva EV, **Hatzenpichler R**, Pelletier E, Schuster N, Hauzmayer S, Bulaev A, Grigorjeva NV, Galushko A, Schmid M, Palatinsky M, Le Paslier D, Daims H, and Wagner M. *Enrichment and genome sequence of the group I.1a ammonia-oxidizing archaeon "Ca. Nitrosotenuis uzonensis" representing a clade globally distributed in thermal habitats*. PLoS One, 8: e80835 (2013) PDF

6. Spang A, Poehlein A, Offre P, Zumbrägel S, Haider S, Rychlik N, Nowka B, Schmeisser C, Lebedeva E, Rattei T, Böhm C, Schmid M, Galushko A, **Hatzenpichler R**, Weinmaier T, Daniel R, Schleper C, Spieck E, Streit W, and Wagner M. *The genome of the ammonia-oxidizing Candidatus Nitrososphaera gargensis: Insights into metabolic versatility and environmental adaptations*. Environ Microbiol, 14: 3122-3145 (2012) PDF

5. **Hatzenpichler R***. *Diversity, physiology, and niche differentiation of ammonia-oxidizing archaea*. Appl Environ Microbiol, 78: 7501-7510 (2012) PDF
► **Review article**

4. Mußmann M, Brito I, Pitcher A, Damsté JS, **Hatzenpichler R**, Richter A, Nielsen JL, Nielsen P H, Müller A, Daims H, Wagner M, and Head IM. *Thaumarchaeotes abundant in refinery nitrifying sludges express amoA but are not obligate autotrophic ammonia oxidizers*. Proc Natl Acad Sci USA, 108: 16771-16776 (2011) PDF

3. Shapiro OH, **Hatzenpichler R***, Buckley DH, Zinder SH, and Orphan VJ. *Multicellular photo-magnetotactic bacteria*. Environ Microbiol Rep, 3: 233-238 (2011) PDF
► **Chief Editor's Choice Article 2011**

2. Spang A, **Hatzenpichler R**, Brochier-Armanet C, Rattei T, Tischler P, Spieck E, Streit W, Stahl DA, Wagner M, and Schleper C. *Distinct gene set in two different lineages of ammonia-oxidizing archaea supports the phylum Thaumarchaeota*. Trends Microbiol 18:331-40 (2010) PDF
► **Cover article**

1. **Hatzenpichler R**, Lebedeva EV, Spieck E, Stoecker K, Richter A, Daims H, and Wagner M. *A moderately thermophilic ammonia-oxidizing crenarchaeote from a hot spring*. Proc Natl Acad Sci USA, 105: 2134-2139 (2008) PDF

Book chapters

4. Hu D, Cui Y, Markillie LM, Chrisler WB, Wang Q, **Hatzenpichler R**, and Orr G. *Counting mRNA copies in intact bacterial cells by fluctuation localization imaging-based fluorescence in situ hybridization (fliFISH)*. Book chapter for *Fluorescence In Situ Hybridization (FISH) for Microbial Cells: Methods and Concepts, Methods in Molecular Biology*, Azevedo N.F and Almeida C (eds.), Vol. 2246, 237-247, Springer Nature (2021) PDF
3. Marlow JJ and **Hatzenpichler R**. *Assessing metabolic activity at methane seeps: a testing ground for slow-growing environmental systems*. Book chapter in Life at Vents and Seeps. 223-259 (2017) PDF
2. Tavormina PL, **Hatzenpicher R**, McGlynn SE, Chadwick G, Dawson K, Connon S, and Orphan VJ. Methyloprofundus. Bergey's Manual of Systematics of Archaea and Bacteria. John Wiley & Sons, Inc. doi: 10.1002/9781118960608.gbm01414 (2016) PDF
1. **Hatzenpichler R*** and Orphan VJ. *Detection of protein-synthesizing microorganisms in the environment via bioorthogonal non-canonical amino acid tagging (BONCAT)*. Book chapter for *Hydrocarbon and Lipid Microbiology Protocols, Vol. 7: Single-cell and single-molecule methods*. Springer Protocols Handbooks, doi: 10.1007/8623_2015_61 (2015) PDF

2 manuscripts in review/revision, 5 in preparation ***corresponding** **equal contribution**

- Marlow JJ, Spietz RL, Kim K, Ellisman M, Girguis P, **Hatzenpichler R***. *Spatially-resolved correlative microscopy and microbial identification reveals dynamic depth- and mineral-dependent anabolic activity in salt marsh sediment*. In revision, Environ Microbiol PDF
- Chadwick GL, Skennerton CT, Laso-Perez R, Leu AO, Speth DR, Yu H, Morgan-Lang C, **Hatzenpichler R**, Goudeau D, Malmstrom RR, Brazelton WJ, Woyke T, Hallam S, Tyson GW, Wegener G, Boetius A, Orphan VJ. *Unique metabolic systems differentiate syntrophic methanotrophic archaea from methanogens*. In review, eLife
- Spietz RL, Frates E, Marlow JJ, Girguis P, **Hatzenpichler R***. *Activity responses of a sediment microbiome to high molecular weight organic carbon addition at cm-scale resolution*. In prep. for Front Microbiol
- Lynes M, Krukenberg V, Jay ZJ, Kohtz A, **Hatzenpichler R***. *Methanogenic archaea outside the Euryarchaeota are widespread and active in Yellowstone hot springs*. In prep. for The ISME J
- Kohtz A, Jay ZJ, Lynes M, Krukenberg V, **Hatzenpichler R***. *Culexarchaeota, a novel archaeal lineage widespread in hydrothermal environments*. In prep. for The ISME J
- Schaible G, Kohtz A, **Hatzenpichler R***. *Correlative Raman-FM-SEM microscopy links identity, biochemistry, and ultrastructure of uncultured microorganisms*. In prep. for Appl Environ Microbiol

External grant funding
Funding raised as PI or Co-PI: $10.8M. From that, total funding to Hatzenpichler lab: $3.3M

- NSF Biological and Chemical Oceanography, $1.42M; $249k to Hatzenpichler, Co-PI, 2021-2023
- NSF Biological Oceanography, $600k; $63k to Hatzenpichler, Co-PI, 2021-2023
- NSF Infrastructure Innovation for Biological Research, $860k; $288k to Hatzenpichler, PI, 2020-2023
- Simons and Gordon and Betty Moore Foundation, $1.92M; $480k to Hatzenpichler, Co-PI, 2020-2023
- NASA Exobiology, $540k, Sole PI, 2019-2022
- NSF Systems and Synthetic Biology, $1.06M; $420k to Hatzenpichler, PI, 2018-2021
- NASA Early Career Fellowship Start-up Program for Named Fellows, $100k, Sole PI, 2018-2021

- Gordon and Betty Moore Foundation, $982k; $519k to Hatzenpichler, PI, 2018-2020
- MJ Murdock Charitable Trust, $174k, institutional proposal, PI, 2018-2020
- NSF RII Track-2 FEC, $1.82M; $110k to Hatzenpichler, Co-PI, 2017-2021
- NSF Major Research Instrumentation, $354k, institutional proposal, PI, 2017-2020
- NASA Exobiology, $431k, Sole PI, 2017-2021

Awarded instrumentation grants #grant ended As PI: $741k; as Co-PI: $156k (in value)

- DOE Joint Genome Institute and Environmental Molecular Sciences Laboratory Facilities Integrating Collaborations for User Science (FICUS) program, $175k, PI, 2020-2022
- DOE Joint Genome Institute Community Science Program, $326k, PI, 2020-2022
- DOE Joint Genome Institute DNA Synthesis Community Science Program, $156k, Co-PI, 2019-2020
- DOE Environmental Molecular Sciences Laboratory General Cycle, $50k, PI, 2019-2020
- DOE Joint Genome Institute and Environmental Molecular Sciences Laboratory Facilities Integrating Collaborations for User Science (FICUS) program, $180k, PI, 2018-2021
- #DOE Joint Genome Institute Small Scale Community Science Program, $9k, 2017-2020

Invited seminars (•, 7) and invited conference/workshop talks (◊, 13) since starting faculty position

◊ 2021, Archaea Online (virtual)
◊ 2021, Joint Academic Microbiology Seminars, Singapore (virtual)
◊ 2021, Center for Dark Energy Biosphere Investigations Speaker Series (virtual)
◊ 2020, Joint International Symposium on Microbial and Biomolecular Interactions, Friedrich Schiller University Jena, Germany (virtual)
◊ 2020, Archaea Cafe, Medical University of Graz, Austria (virtual)
• 2020, Dep. of Land Resources and Environmental Sciences, Montana State University, Bozeman, MT
• 2020, MicroSeminar, International Society for Microbial Ecology (virtual)
◊ 2020, NSF EPSCOR Bug ReMeDEE Workshop (virtual)
◊ 2019, Gordon Research Conference Applied and Environmental Microbiology. South Hadley, MA
• 2019, John Lawrence Seminar, Lawrence Berkeley National Laboratory, Berkeley, CA
• 2018, Department of Microbiology, University of Hamburg, Hamburg, Germany
◊ 2018, Engineering the Microbiome workshop, University of Wisconsin. Madison, WI
◊ 2018, NSF-HHMI conference on New Opportunities to Study Origins of the Eukaryotic Cell. Howard Hughes Medical Institute, Janelia Research Campus, Ashburn, VA
• 2018, BioTechnology Institute, University of Minnesota, St. Paul, MN
• 2017, Marine Science Institute, The University of Texas at Austin, Austin TX
◊ 2017, Annual workshop of the NSF Center for Dark Energy Biosphere Investigations, Marina, CA
◊ 2017, Gordon Research Conference on Archaea, Waterville, NH
• 2017, Department of Geosciences, University of Calgary, Calgary, Canada
• **23 invited seminars and 5 invited conference talks prior to starting tenure track faculty position**

Contributed conference presentations by Hatzenpichler or members of his lab

• 6 talks since 2017 (postdocs or graduate students)
◊ 21 poster presentations since 2017 (postdocs, graduate students, staff scientists, undergraduate students)

Professional service

- **2020-present, Editorial Board Member, Environmental Microbiology and Environmental Microbiology Reports** (Impact factors: 5.147 and 2.874, respectively)
- Jan 2020-present, Member of Early Career Faculty Advisory Panel to the Center for Biofilm Engineering, Montana State University

- **2019-present, Steering committee member, Network for Life Detection (Nfold).** NfoLD is a NASA Astrobiology Research Coordination Network dedicated to advancing the science and technology required to search for evidence of life beyond Earth. www.nfold.org
- **2018-present, Editorial Board Member, The ISME Journal.** Impact factor: 9.52 (2018)
- **2015-present, Associate Editor, *Frontiers in Microbiology*, *Microbial Physiology and Metabolism*.** Impact factor: 4.08 (2018)
- 2014-2017, Elected member of the Junior Advisory Group of the American Society for Microbiology
- 2016, member of General Meeting Planning Committee for *ASM Microbe 2016*, Boston, MA
- 2015-2017, convener of plenary session at the ASM General Meetings in 2015, 2016 and 2017
- **regular *ad hoc* reviewer for:** The ISME Journal, Nature Microbiology, Nature Communications, Environmental Microbiology, Environmental Microbiology Reports, FEMS Microbiology Reviews, Applied and Environmental Microbiology, Frontiers in Microbiology, FEMS Microbiology Ecology, mSphere, eLife, Nature Biofilms and Microbiomes, PLoS One, Microbiology, Scientific Reports, Antonie van Leeuwenhoek Journal of Microbiology, Environmental Science and Technology, mSystems
- **panellist or external reviewer for grant and fellowship applications** (year as panellist; *chair of panel): NASA Exobiology (2015, 2018, 2019*, 2020*), NSF MRI BIO (2018), DOE Joint Genome Institute Community Science Program (2017-2019), DOE Environmental Molecular Sciences Laboratory (2018, 2020), NSF IIBR Instrumentation and Research Methods (*2020), Montana NASA EPSCoR (2017), NASA Astrobiology Institute CAN-8, NASA Earth and Space Sciences Graduate Fellowship program, NSF Biological Oceanography, NSF Symbiosis, Defense and Recognition (2020), M.J. Murdock Charitable Trust, French National Research Agency, Natural Sciences and Engineering Research Council of Canada (NSERC)
- 2009, Organizer of the 7^{th} *International workshop on New Techniques In Microbial Ecology* (INTIME7)

Mentees

- Mackenzie Lynes, graduate student, 2017-present; diversity and biogeography of uncultured microbes in hot springs of Yellowstone National Park; *in situ* structure-function analyses of hot spring microbes
- Nick Reichart, graduate student, 2017-present; ecophysiology of microbial dark matter in hot springs; developing novel bioorthogonal labeling approaches to identify novel cellulolytic thermophiles
- Viola Krukenberg, postdoc, 2017-present; anaerobic carbon-cycling potential of microbes in Guaymas basin sediments through activity-based cell sorting and single cell genomics
- Anthony Kohtz, graduate student, 2018-present; characterizing the physiology of a novel archaeal lineage in hot springs; development of new click chemistry labeling techniques to identify cells
- George Schaible, graduate student, 2018-present; characterizing the biology of uncultured multicellular magnetotactic bacteria through genomics, *in situ* observation, targeted cultivation, and activity tracing
- William Christian, graduate student, 2019-present; ecology and physiology of microbes responsible for the methane paradox in freshwater systems
- Andrew Montgomery, postdoc, starting Jul 2021; *in situ* and *ex situ* activity of deep-sea sediment microorganisms revealed via Raman and BONCAT activity-based cell sorting and metatranscriptomics
- Ashley Cohen, postdoc, starting Jul 2021; ecophysiology of Asgard archaea

Former mentees

- Rachel Lange Spietz, postdoc, 2018-2019; now postdoc at Montana State University
- undergraduate researchers working for (x, year) semesters in my lab: Margaret Branine (1, 2016), Juliana Beauchene (1, 2017), Clark Copeland (1, 2018), Michael Dorle (3, 2016-2017), Rylee Green (2, 2017-2018), Michael Laase (1, 2019), Fiona Lewis (1, 2019), Kelli Ober (1, 2019), Berliza Soriano (REU, 1, 2018), Grace Trytten (1, 2017), Amanda Wilkins (1, 2020), Paige Schlegel (3, 2020-present)

Teaching

- BCH 544, Molecular Biology. Class designed for 1st-2nd year graduate students. Taught every fall semester. Typically, 10-12 graduate students from microbiology, biochemistry, molecular biology, virology, chemical and biological engineering, and agricultural sciences
- BCH 380, Biochemistry. Undergraduate level introduction to biochemistry for non-majors, taught every spring semester. Typically, 110-130 undergraduate students

Professional memberships

- American Association for the Advancement of Science (AAAS)
- Austrian Scientists and Scholars in North America (ASCINA)
- American Society for Microbiology (ASM)
- International Society for Microbial Ecology (ISME)