

Barbara Bayer, Ph.D.

Centre for Microbiology and Environmental Systems Science

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Current position

Since 2024 **Assistant Professor for Microbiology of Aquatic Ecosystems**
Centre for Microbiology and Environmental Systems Science, University of Vienna, Austria

Previous positions

2021 – 2023 **Senior postdoctoral researcher**
Department of Microbiology and Ecosystem Science, University of Vienna, Austria
(*Advisors:* Prof. Dr. Michael Wagner, Prof. Dr. Holger Daims)

2019 – 2021 **Postdoctoral research fellow**
Department of Ecology, Evolution and Marine Biology, University of California, Santa Barbara, United States (*Advisor:* Assoc.-Prof. Dr. Alyson Santoro)

5 – 7/2019 **Postdoctoral researcher**
Department of Microbiology and Ecosystem Science, University of Vienna, Austria
(*Advisors:* Prof. Dr. Michael Wagner, Prof. Dr. Holger Daims)

Education

2019 **Ph.D. in Biology**
Department of Limnology and Bio-Oceanography, University of Vienna, Austria
Supervisor: Prof. Dr. Gerhard J. Herndl

2014 **M.Sc. in Ecology**
Department of Limnology and Bio-Oceanography, University of Vienna, Austria
Supervisors: Prof. Dr. Gerhard J. Herndl and Prof. Dr. Christa Schleper

2012 **B.Sc. in Biology** (Specialization: Microbiology and Genetics)
University of Vienna, Austria

Fellowships and Awards

2023 ERC Starting Grant

2023 FWF START Award

2022 Discover the Microverse Scientific Image Competition Award

2020 Rückenwind Funding Bonus, alpha+ Foundation

2020 Poster award at the ISME Virtual Microbial Ecology Summit, Unity in Diversity

2019 FWF Erwin Schrödinger Postdoctoral Fellowship

2015 Uni:docs Doctoral Fellowship for outstanding early stage researchers

Research Funding Acquisition

ERC Starting Grant – *Methane paradox revisited: Unravelling the impacts of eutrophication on microbial methane cycling in aquatic ecosystems* (PI: Bayer), 1.497.793€, 2024-2029

FWF START Award – *Microbial methane cycling in aquatic ecosystems* (PI: Bayer), 1.200.000 € (declined in favor of the ERC Starting Grant)

FWF Erwin Schrödinger project J4426-B - *The influence of nitrifiers on the oceanic carbon cycle* (PI: Bayer), 171.080 €, 2020-2023

JGI CSP New investigator grant 506203 - *Interactions between chemoautotrophic and heterotrophic bacteria investigated using combined transcriptomics and metabolomics* (PI: Santoro, co-PI: Bayer), 2020-2022

Uni.doc's Doctoral Fellowship - *Significance of selected major microbial groups in the oxygenated deep ocean*, 102.526 €, 2015-2018

Publications in Peer-reviewed Journals

h-index: 14; citations (January 2025): 1057

#corresponding author, &mentored student

23. Li M, Thieringer PH, **Bayer B**, Kellom M, Santoro AE. Genome sequence of *Nitrosopumilus adriaticus* CCS1 assembled from an ammonia-oxidizing enrichment culture (2024). *Microbiol Resour Announc* 13:e00692-24. <https://doi.org/10.1128/mra.00692-24>

22. **Bayer B**[#], Liu S, Louie K, Northen TR, Wagner M, Daims H, Carlson CA, Santoro AE. Metabolite release by nitrifiers facilitates metabolic interactions in the ocean (2024). *ISME J* 18:wrae172. <https://doi.org/10.1093/ismejo/wrae172>

21. Debeljak P, **Bayer B**, Sun Y, Obernosterer I, Herndl GJ. Seasonal patterns in microbial carbon and iron transporter expression in the Southern Ocean (2023). *Microbiome* 11:187. <https://doi.org/10.1186/s40168-023-01600-3>

20. Tinta T, Zhao Z, **Bayer B**, Herndl GJ. Jellyfish detritus supports niche partitioning and metabolic interactions among marine bacteria (2023). *Microbiome* 11:156. <https://doi.org/10.1186/s40168-023-01598-8>

19. Herndl GJ, **Bayer B**, Baltar F, Reinthaler T. Prokaryotic Life in the Deep Ocean's Water Column (2023). *Ann Rev Mar Sci* 15:461-483. <https://doi.org/10.1146/annurev-marine-032122-115655>

18. **Bayer B**[#], McBeain K, Carlson CA, Santoro AE. Carbon content, carbon fixation yield and dissolved organic carbon release from diverse marine nitrifiers (2023). *Limnol Oceanogr.* 68:84-96. <https://doi.org/10.1002/lno.12252>

17. Zakem EJ, **Bayer B**, Qin W, Santoro AE, Zhang Y, Levine NM. Global-scale abundances, nitrification rates, and carbon fixation rates of marine nitrifying microorganisms (2022). *Biogeosciences* 19:5401-5418. <https://doi.org/10.5194/bg-19-5401-2022>

16. **Bayer B**[#], Kellom M, Valois F, Waterbury JB, Santoro AE[#]. Complete genome sequences of two phylogenetically distinct *Nitrospina* isolated from the Atlantic and Pacific Oceans (2022). *Microbiol Resour Announc* 11:e00100-22. <https://doi.org/10.1128/mra.00100-22>

15. Elling F, Evans TW, Hemingway JD, Kharbush JJ, Nathan V, **Bayer B**, Spieck E, Summons RE, Pearson A. Marine and terrestrial nitrifying bacteria are sources of diverse bacteriohopanepolyols (2022). *Geobiology* 20:399-420. <https://doi.org/10.1111/gbi.12484>
14. Jung M-Y, Sedlacek CJ, Kits KD, Mueller AJ, Rhee S-K, Hink L, Nicol GW, **Bayer B**, Lehtovirta-Morley L, Wright CL, de la Torre JR, Herbold CW, Pjevac P, Daims H, Wagner M. Ammonia-oxidizing archaea possess a wide range of cellular ammonia affinities (2022). *ISME J.* 16:272-283. <https://doi.org/10.1038/s41396-021-01064-z>
13. Debeljak P, Blain S, Bowie A, van der Merwe P, **Bayer B**, Obernosterer I. Homeostasis drives intense microbial trace metal processing on marine particles (2021). *Limnol Oceanogr* 66:3842-3855. <https://doi.org/10.1002/lno.11923>
12. **Bayer B**[#], Saito MA, McIlvin M, Lückner S, Moran DM, Lankiewicz TS, Dupont CL, Santoro AE[#]. Metabolic versatility of the nitrite-oxidizing bacterium *Nitrospira marina* and its proteomic response to oxygen-limited conditions (2021). *ISME J.* 15:1025-1039. <https://doi.org/10.1038/s41396-020-00828-3>
11. Tinta T, Zhao Z, Escobar A, Klun K, **Bayer B**, Amano C, Bamonti L, Herndl GJ. Microbial processing of jellyfish detritus in the ocean (2020). *Front Microbiol.* 11:2638. <https://doi.org/10.3389/fmicb.2020.590995>
10. Reyes C, Hodgskiss LH, Kerou M, Pribasnik T, Abby SS, **Bayer B**, Krämer SM, Schleper C. Genome wide transcriptomic analysis of the soil ammonia oxidizing archaeon *Nitrososphaera viennensis* upon exposure to copper limitation (2020). *ISME J.* 14:2659-2674. <https://doi.org/10.1038/s41396-020-0715-2>
9. Mooshammer M, Alves RJE, **Bayer B**, Melcher M, Stieglmeier M, Jochum L, Watzka M, Schleper C, Herndl GJ, Wanek W. Nitrogen isotope fractionation during archaeal ammonia oxidation: Coupled estimates from measurements of residual ammonium and accumulated nitrite (2020). *Front Microbiol* 11:1710. <https://doi.org/10.3389/fmicb.2020.01710>
8. Reyes C, Hodgskiss L, Baars O, Kerou M, **Bayer B**, Schleper C, Krämer S. Copper limiting threshold in the terrestrial ammonia oxidizing archaeon *Nitrososphaera viennensis* (2020). *Res Microbiol* 171:134-172. <https://doi.org/10.1026/j.resmic.2020.01.003>
7. Muck S, De Corte D, Clifford E, **Bayer B**, Herndl GJ, Sintés E. Niche differentiation of aerobic and anaerobic ammonia oxidizers in a high latitude deep oxygen minimum zone (2019). *Front Microbiol* 10:2141. <https://doi.org/10.3389/fmicb.2019.02141>
6. **Bayer B**[#], Hansman R, Bittner MJ[&], Ortega-Noriega BE, Niggemann J, Dittmar T, Herndl GJ. Ammonia-oxidizing archaea release a suite of organic compounds potentially fueling prokaryotic heterotrophy in the ocean (2019). *Environ Microbiol* 21:4062-4075. <https://doi.org/10.1111/1462-2920.14755>
5. Baltar F, **Bayer B**, Bednarsek N, Deppeler S, Escribano R, Gonzalez CE, Hansman RL, Mishra RK, Moran MA, Repeta DJ, Robinson C, Sintés E, Tamburini C, Valentin LE, Herndl GJ (2019). Towards integrating evolution, metabolism and climate change studies of marine ecosystems. *Trends in Ecology & Evolution* 34:1022-1033. <https://doi.org/10.1016/j.tree.2019.07.003>
4. **Bayer B**[#], Pelikan C, Bittner MJ[&], Reinthaler T, Könneke M, Herndl GJ, Offre P. Proteomic response of three marine ammonia-oxidizing archaea to hydrogen peroxide and their metabolic interactions with a heterotrophic alphaproteobacterium (2019). *mSystems* 4: e00181-19. <https://doi.org/10.1128/mSystems.00181-19>
3. **Bayer B**[#], Vojvoda J, Reinthaler T, Reyes C, Pinto M, Herndl GJ. *Nitrosopumilus adriaticus* sp. nov. and *Nitrosopumilus piranensis* sp. nov., two ammonia-oxidizing archaea from the Adriatic Sea and members of the class *Nitrososphaeria* (2019). *Int J System Evol Microbiol* 7:1892-1902. <https://doi.org/10.1099/ijsem.0.003360>

2. Elling FJ, Könneke M, Nicol GW, Stieglmeier M, **Bayer B**, Spieck E, De La Torre JR, Becker KW, Prosser JJ, Herndl GJ, Schleper C, Hinrichs KU (2017). Chemotaxonomic characterisation of the thaumarchaeal lipidome. *Environ Microbiol* 19:2681-2700. <https://doi.org/10.1111/1462-2920.13759>

1. **Bayer B**[#], Vojvoda J, Offre P, Alves RJE, Elisabeth NH, Garcia JA, Volland JM, Srivastava A, Schleper C, Herndl GJ. Physiological and genomic characterization of two novel marine thaumarchaeal strains indicates niche differentiation (2016). *ISME J* 10:1051-1063. <https://doi.org/10.1038/ismej.2015.200>

Book Chapters

Santoro AE, **Bayer B**, Elling FJ, Pearson A. Candidatus Nitrosopelagicus (2021). *Bergey's Manual of Systematics of Archaea and Bacteria*. <https://doi.org/10.1002/9781118960608.gbm01969>

Invited Talks and Conference Talks

- 2024 EuroC1&BVOC Symposium, Wageningen, The Netherlands
- 2024 ACTIONr Webinar Series, Online
- 2024 Ocean Sciences Meeting, New Orleans, USA
- 2023 Radboud University, The Netherlands
- 2022 International Symposium on Microbial Ecology (ISME18), Lausanne, Switzerland
- 2021 International Conference of Nitrification and related processes (ICON7), Online
- 2019 University of Oldenburg, Germany
- 2018 Marine Microbes Gordon Research Seminar, Lucca, Italy
- 2017 IMBIZO5 Workshop on Marine Biosphere Research for a sustainable Ocean, Woods Hole, USA
- 2017 EMBO Symposium on Aquatic Microbial Ecology (SAME), Zagreb, Croatia
- 2017 International Conference of Nitrification and related processes (ICON5), Vienna, Austria
- 2015 Aquatic Sciences Meeting (ASLO), Granada, Spain

Field and Sea Experience

- 2024 R/V *Alkor*: Boknis Eck Time Series Station, Baltic Sea (1 day)
- 2024 Multiple expeditions to Mondsee, Attersee and Lunzer See, Austria
- 2023 R/V *Atlantis*: CliOMZ Cruise, Eastern Tropical Pacific Ocean, Golfito to San Diego (38 days)
- 2021 R/V *Roger Revelle*: Deep Sea Food Webs, Eastern North Pacific Ocean, San Diego (16 days)
- 2019 R/V *Sally Ride*: Santa Barbara Channel, San Francisco to San Diego, USA (7 days)
- 2018 R/V *Marion Dufresne*: MobyDick Cruise, South Indian Ocean, La Reunion, France (40 days)
- 2017 R/V *Nereis II*: North West Mediterranean Sea, Banyuls-sur-Mer, France (1 day)
- 2016 R/V *Sonne*: BacGeoPac Cruise, Pacific Ocean, New Zealand to Alaska, USA (34 days)
- 2015 R/V *Kilo Moana*: C-MORE Summer Course on Microbial Oceanography, North Pacific Ocean, Hawaii, USA (8 days)

Supervision and Mentorship

- Florian Gelbmann (MSc Student, University of Vienna, since 2024)
- Kira Lange (PhD Student, University of Vienna, since 2024)
- Niharika Sharma (Postdoc, University of Vienna, since 2024)
- Zeynep Kurt (PhD Student, University of Vienna, since 2024)
- Manuela Felsberger (MSc Thesis, University of Vienna, since 2024)
- Eloise Atkinson (MSc Thesis, University of Vienna, 2023-now)
- Maria Cristina Cueva Carrión (BSc Thesis, University of Vienna, 2024)

Bence Molnár (MSc Student, University of Vienna, 2022)
Kiera Sullivan (BSc Student, University of California, Santa Barbara, 2020/21)
Meriel J. Bittner (MSc Thesis, University of Vienna, 2017-2019)
Edwin Kniha (MSc Student, University of Vienna, 2016)
Teresa Langer (BSc Student, University of Vienna, 2016)
Martina Stockinger (BSc Student, University of Vienna, 2016)

Professional Services and Affiliations

Member of the Board of Experts of the Austrian Microbiome Initiative (AMICI)

Member of the Advisory Board for Postdoc Services at the University of Vienna

Early career workshop organization and session chair for poster talks “Biochemistry and Biomarkers”, International Conference of Nitrification and related processes (ICON5), Vienna, Austria

Ad-Hoc Peer Review: Nature Microbiology, PNAS, The ISME Journal, Communications Earth & Environment, Global Biogeochemical Cycles, Limnology and Oceanography, Environmental Microbiology, Biogeosciences, mBio, mSystems, Applied and Environmental Microbiology, Aquatic Microbial Ecology, FEMS Microbiology Letters, Frontiers in Marine Science, Frontiers in Microbiology, Marine Ecology Progress Series (>50 verified reviews on Web of Science)

PhD thesis advisory committee member:

Samu Sellmaier (Leibniz Institute for Baltic Sea Research, Warnemünde)

Charlotte Doebke (WasserCluster Lunz / University of Vienna)

Helena Cvetkovic (University of Vienna)

PhD thesis examiner:

Cas Cornet (French Institute for Ocean Science, Brest / Center for Marine Environmental Sciences, Bremen)

Teaching and Outreach

Course overview: <https://ufind.univie.ac.at/en/person.html?id=55775>

Interview about the “methane paradox” in the Austrian newspaper Die Presse ([Link to Article](#))

Video profile in the Scilog magazine of the Austrian Science Fund (FWF) ([Link to Video](#))

Video interview with the Austrian Science Fund (FWF) for the International Day for Women and Girls in Science ([Link to Video](#))

Blog post “Unerforschte, spannende Tiefseebewohner” during the Mobydick research cruise in the South Indian Ocean ([Link to article](#))