



Erik Bakkeren, Dr. Sc.

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Academic Experience

09/2025 – present: Assistant Professor, Department of Biological Sciences, University of Calgary, Canada

- Molecular Genetics for Microbiome Editing (**Canada Research Chair Tier II nominee**)

02/2021 – 08/2025: SNSF Postdoctoral Mobility Fellow, Prof. Kevin Foster's group, University of Oxford, UK

- Competition between bacteria in the gut
- Anaerobic culturing of microbiota members
- Mathematical modeling of microbial interactions
- Gnotobiotic mouse models

07/2016 – 01/2021: PhD and Master's Thesis, Prof. Wolf-Dietrich Hardt's Group, ETH Zürich, Switzerland, with a 4-month Postdoc

- Persistence and evolution of antibiotic resistance in Enterobacteriaceae
- Evolution of virulence using the model gut pathogen *Salmonella* Typhimurium
- Models of gut colonization and infection in mice

01/2012 – 08/2015: Undergraduate Research and Honour's Thesis, Prof. James Kronstad's Group, Michael Smith Laboratories, UBC, Vancouver, Canada

- Iron homeostasis and pathogenesis of *Cryptococcus neoformans*
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Education

Dr. sc. ETH Zurich: 02/2017 – 09/2020

Eidgenössische Technische Hochschule (ETH) Zürich, Switzerland

PhD thesis: The evolution and adaptation of Enterobacteriaceae in the murine gut

Defense date: 24/09/2020

M. Sc. Biology Major in Microbiology and Immunology: 09/2015 – 01/2017

Eidgenössische Technische Hochschule (ETH) Zürich, Switzerland

Master's thesis: Evolution of virulence in *Salmonella enterica* Typhimurium by horizontally acquired genetic elements

Cumulative average: **5.74** (maximum score of 6)

B. Sc. Honours in Microbiology and Immunology: 09/2011 – 05/2015

University of British Columbia (UBC), Vancouver, Canada

Cumulative average: **90.3% / A+** (maximum score of 100%)

Selected Publications (full list at end of CV)

Bakkeren E, Piskovsky V, Lee M, Jahn M, Foster KF. Strain displacement in microbiomes via ecological competition. 2025. **Nature Microbiology**. (Accepted, *in press*)

Spragge F*, **Bakkeren E***, Jahn MT, Araujo EBN, Pearson CF, Wang X, Pankhurst L, Cunrath O, Foster KF. Microbiome diversity protects against pathogens by nutrient blocking. 2023. **Science**.
Doi: <https://doi.org/10.1126/science.adj3502> (* co-first authors)

Bakkeren E, Huisman JS, Fattinger SA, Hausmann A, Furter M, Egli A, Slack E, Sellin ME, Bonhoeffer S, Regoes RR, Diard M, Hardt WD. Salmonella persists promote the spread of antibiotic resistance plasmids in the gut. 2019. **Nature**. Doi: 10.1038/s41586-019-1521-8

Fellowships, Grants, and Awards

Funded research projects and fellowships

Awarded 12/2024, but declined: *BBSRC Fellowship* (GBP 511 463; 36 months) – Independent research hosted in Prof. Kevin Foster's group

08/2022 – 01/2024: *SNSF Postdoc Mobility Fellowship* (CHF 94 500; 18 months) – Postdoctoral research in Prof. Kevin Foster's group

02/2021 – 07/2022: *SNSF Early Postdoc Mobility Fellowship* (CHF 83 650; 18 months) – Postdoctoral research in Prof. Kevin Foster's group

01/2018 – 12/2019: *Boehringer Ingelheim PhD Fellowship* (EUR 79 200; 24 months) – Dr. Sc. in Prof. Wolf-Dietrich Hardt's group

09/2015 – 01/2017: *Excellence Scholarship & Opportunity Programme* (CHF 33 000; 18 months) – M. Sc at ETH Zurich

05/2014 – 08/2014: *Student Undergraduate Research Experience Award* (4500 CAD; 4 months) – research placement in Prof. James Kronstad's group

05/2013 – 08/2013: *Dean of Science Research Award* (4500 CAD; 4 months) – research placement in Prof. James Kronstad's group

Awards

01/2025: *2024 Marvellous Mentor Award*. Recognition for outstanding mentorship (nominated by trainees), Dunn School, University of Oxford

05/2024: *Microbiology Society Education and Outreach Grant* (GBP 1 000) towards outreach at Glastonbury Music Festival, UK, 2024

05/2024: *IMPACTT 2024 Postdoctoral Travel Award* (CAD 250) towards travel costs at the IMPACTT conference in Canmore, Canada, 2024

08/2022: *Swiss Society for Microbiology PhD Award* (CHF 2 000 + travel expenses covered for an invited talk at the annual congress) for outstanding Doctoral Thesis

07/2021: *ETH Medal* (CHF 2000) for outstanding Doctoral Thesis

07/2019: *Best oral presentation award* – EMBO New Approaches and Concepts in Microbiology conference (EUR 250)

08/2018: *Best oral presentation award - prokaryotic biology* – Swiss Society for Microbiology Annual Congress 2018 (CHF 500)

12/2017: *ETH Medal* (CHF 2000) for outstanding Master Thesis

04/2015: *George Spiegelman Award* (300 CAD) – Department of Microbiology and Immunology, University of British Columbia

04/2013: *UBC Trek Excellence Scholarship for Continuing Students* (1500 CAD) – B. Sc at the University of British Columbia

Supervision

Trainees under official supervision:

Master's students

09/2025 – present: MSc student, University of Calgary, Canada

Unofficial mentorship:

PhD students (design of research project and mentorship)

10/2023 – present: DPhil student, University of Oxford, UK.

04/2023 – present: DPhil DTP student, University of Oxford, UK.

Master's students (design and supervision of research projects)

09/2022 – 05/2023: MBiol Part 2 Project student, University of Oxford, UK. *Student Awarded a Department Project Prize for Outstanding Research Project*

02/2020 – 06/2021: Semester and Master's thesis student. ETH Zurich, Switzerland. *Student Awarded ETH Medal for Outstanding Master Thesis*

01/2019 – 05/2019: Master's thesis student, Uppsala University, Sweden (hosted at ETH).

09/2018 – 03/2020: Semester and Master's thesis student, ETH Zurich, Switzerland.

Teaching

Lectures and Courses

09/2023 – 07/2025: *Practical course organizer and lecturer, University of Oxford, UK*

Lectures on experimental evolution, supervising teaching assistants, organizing an experimental evolution practical, setting and marking exams (8 classes of the practical course per year; ~100 students)

03/2022 – 03/2024: *Advanced Ecology and Evolution lecture, University of Oxford, UK*

Co-delivered lecture and teaching assistant for a 2h microbiome class, once per year.

10/2017 – 11/2020: *Design and supervision of lab rotations for final year bachelor students (3-week projects), ETH Zurich, Switzerland*

3 students, 1 project per year; 1h Lecture on "Evolution of bacterial pathogens"

Workshops

11/2024: *Workshop lecture: Microbiome dynamics and antibiotic resistance: a mathematical perspective, ETH Zurich, Switzerland*

Lecture title: "Ecology of the human gut microbiome: using bacterial competition to target problematic strains"

10/2024: *Workshop lecture: NDPIA Microbiota and Health course, Stockholm, Sweden*

Lecture title: "Microbiome ecology and evolution of bacterial virulence"

11/2022: *Workshop lecture: NDPIA Microbiota and Health course, Lerum, Sweden*

Lecture title: "Competition in the gut microbiome"

Tutorials and Other Teaching

10/2021 – 02/2024: *Tutorials for 2nd and 3rd year Biology, University of Oxford, UK*

Average of 4 tutorials per semester (1h each plus preparation time)

02/2016 – 05/2017: *Teaching assistant: Introductory practical laboratory courses for 1st year bachelor students, ETH Zurich, Switzerland*

Biochemistry practical course (2016) and Microbiology practical course (2017)

Engagement and Community Contributions

Conference organization

05/2024 – present: MEEHubs2026

Co-lead organizer of the next iteration of MEEHubs2024 (planned for 2026)

12/2021 – 02/2024: MEEHubs2024

Co-lead organizer of a hybrid-virtual hub-based Microbiology Ecology and Evolution conference (MEEHubs2024) – took place in 01/2024

Outreach

03/2024 – 07/2024: Microbiome outreach at Glastonbury Music Festival 2024

Raised funding for and co-ran a stall to communicate the benefits and function of the gut microbiome to festival goers and correct misinformation

10/2023 – present: Skype-a-scientist outreach

Communication of active microbiome research to classes of school-age children

Society memberships

03/2024 – 03/2025: British Ecological Society

05/2021 – 05/2025: Microbiology Society (UK)

Peer reviewer activity

04/2024 – present: Editorial Board of the ISME Journal

Ad hoc reviewer for Science, PLoS Path, Nat Microbiol, Nat Commun, Cell Host Microbe

Conference Presentations and Seminars

Invited talks

10/2023: Seminars in Microbiology, ETH Zurich, Zurich, Switzerland

09/2022: Swiss Society for Microbiology Annual Congress 2022, Lausanne, Switzerland

10/2019: Junior Awards in Microbiology (J.A.M.) talk at University of Birmingham, UK

Oral presentations

06/2024: Having IMPACTT 4: Advancing Microbiome Research, Canmore, Canada

11/2022: OxBacNet: Seminar for bacteriologists working in Oxford, Oxford, UK

08/2022: European Society for Evolutionary Biology (ESEB 2022), Prague, Czechia

08/2020: Microbial Ecology and Evolution Virtual conference 2020

07/2019: EMBO New Approaches and Concepts in Microbiology Conference 2019, Heidelberg, Germany

08/2018: Swiss Society for Microbiology Annual Congress 2018, Lausanne, Switzerland

Poster presentations

- 04/2024:** Microbiology Society UK Annual Conference 2024, Edinburgh, UK
- 06/2023:** Cell Symposia: Infection biology in the age of the microbiome, Paris, France
- 12/2022:** The Human Microbiome: Ecology and Evolution (Keystone), Banff, Canada
- 07/2021:** EMBO New Approaches and Concepts in Microbiology Conference 2021 (virtual)
- 06/2021:** World Microbe Forum (joint FEMS + ASM virtual conference; virtual)
- 08/2017:** Swiss Society for Microbiology Annual Congress 2017, Basel, Switzerland
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Professional Development Courses

- 03/2024 – 05/2024:** Indigenous Canada, University of Alberta, Faculty of Native Studies (online course, 12 modules)
- 06/2023:** Equality & Diversity Briefing, Equality and Diversity Unit, University of Oxford, UK (online course)
- 09/2021:** Implicit bias in the workplace, Equality and Diversity Unit, University of Oxford, UK (online course)
- 04/2021 – 05/2021:** PIL A&B (Animal ethics in research in the UK), University of Oxford Medical Sciences Division, UK
- 06/2018:** Boehringer Ingelheim Fonds “Communicating Science” workshop, Mainz, Germany
- 06/2017:** LTK Module 1: Introductory course in Laboratory Animal Science (Animal ethics and handling), University of Zurich, Institute of Laboratory Animal Science, Switzerland
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Other interests and activities

Ultramarathon running, road cycling, rock climbing, hiking, skiing, acoustic guitar

Full list of Publications

2025

1. **Bakkeren E**, Piskovsky V, Lee M, Jahn M, Foster KF. Strain displacement in microbiomes via ecological competition. 2025. **Nature Microbiology**. (Accepted, *in press*)
2. Newson KPM, McHugh SC, Steiger Y, Gürtler F, **Bakkeren E**, Hardt WD. Antibiotic-recalcitrant *Salmonella* exploits post-antibiotic microbiota disruption to achieve virulence-dependent transmission. 2025. **Cell Rep**. Doi: <https://doi.org/10.1016/j.celrep.2025.115969>
3. **Bakkeren E**, Piskovsky V, Foster KR. Metabolic ecology of microbiomes: Nutrient competition, host benefits, and community engineering. 2025. **Cell Host Microbe**. Doi: <https://doi.org/10.1016/j.chom.2025.05.013>
4. Santamaria de Souza N, Cherrak Y, Andersen TB, Vetsch M, Barthel M, Kroon S, **Bakkeren E**, Schubert C, Christen P, Kiefer P, Vorholt JA, Nguyen BD, Hardt WD. 2025. **Nat. Commun**. Doi: <https://doi.org/10.1038/s41467-025-56851-5>
5. Wenger A, **Bakkeren E**, Granato E, Tecon R, Mitri S, Möbius W. MEEHubs2024: A hub-based conferences on microbial ecology and evolution fostering sustainability. 2025. **FEMS Microbiol. Lett**. Doi: <https://doi.org/10.1093/femsle/fnaf022>

2024

6. Hu G, Qu X, Bhalla K, Xue P, **Bakkeren E**, Lee CW, Kronstad JW. Loss of the putative Rab GTPase, Ypt7, impairs the virulence of *Cryptococcus neoformans*. 2024. **Front. Microbiol.** Doi: <https://doi.org/10.3389/fmicb.2024.1437579>
7. Gül E, Huuskonen J, Younes AA, Maurer L, Enz U, Zimmermann J, Sellin ME, **Bakkeren E**, Hardt WD. Salmonella T3SS-2 virulence enhances gut-luminal colonization by enabling chemotaxis-dependent exploitation of intestinal inflammation. 2024. **Cell Rep.** Doi: <https://doi.org/10.1016/j.celrep.2024.113925>

2023

8. Spragge F*, **Bakkeren E***, Jahn MT, Araujo EBN, Pearson CF, Wang X, Pankhurst L, Cunrath O, Foster KF. Microbiome diversity protects against pathogens by nutrient blocking. 2023. **Science**. Doi: <https://doi.org/10.1126/science.adj3502> (* co-first authors)
9. Gül E, **Bakkeren E**, Salazar G, Steiger Y, Younes AA, Clerc M, Christen P, Fattinger SA, Nguyen BD, Kiefer P, Slack E, Ackermann M, Vorholt JA, Sunagawa S, Diard M, Hardt WD. The microbiota conditions a gut milieu that selects for wild-type *Salmonella* Typhimurium virulence. 2023. **PLoS Biology**. Doi: <https://doi.org/10.1371/journal.pbio.3002253>
10. Gül E, Younes AA, Huuskonen J, Diawara C, Nguyen BD, Maurer L, **Bakkeren E**, Hardt WD. Differences in carbon metabolic capacity fuel co-existence and plasmid transfer between *Salmonella* strains in the mouse gut. 2023. **Cell Host Microbe**. Doi: <https://doi.org/10.1016/j.chom.2023.05.029>

2022

11. **Bakkeren E**, Gul E, Huisman JS, Steiger Y, Rocker A, Hardt WD, Diard M. Impact of horizontal gene transfer on emergence and stability of cooperative virulence in *Salmonella* Typhimurium. 2022. **Nat. Commun.** Doi: <https://doi.org/10.1038/s41467-022-29597-7>
12. Gaissmaier MS, Laganenka L, Herzog MK, **Bakkeren E**, Hardt WD. The mobilizable plasmid P3 of *Salmonella enterica* serovar Typhimurium SL1344 depends on the P2 plasmid for conjugative transfer into a broad range of bacteria in vitro and in vivo. 2022. **J. Bacteriol.** Doi: <https://doi.org/10.1128/jb.00347-22>

2021

13. **Bakkeren E**, Herter JA, Huisman JS, Steiger Y, Gul E, Newson JPM, Brachmann AO, Piel J, Regoes RR, Bonhoeffer S, Diard M, Hardt WD. Pathogen invasion-dependent tissue reservoirs and plasmid-encoded antibiotic degradation boost plasmid spread in the gut. 2021. **eLife**. Doi: <https://doi.org/10.7554/eLife.69744>. **Co-corresponding author**.
14. Hu G*, **Bakkeren E***, Caza M, Horianopoulos L, Sanchez-Leon E, Sorensen M, Jung W, Kronstad JW. Vam6/Vps39/TRAP1-domain proteins influence vacuolar morphology, iron acquisition and virulence in *Cryptococcus neoformans*. 2021. **Cell. Microbiol.** Doi: <https://doi.org/10.1111/cmi.13400> (* co-first authors)
15. **Bakkeren E***, Newson JPM*, Hardt WD. Analysis of *Salmonella* Persister Population Sizes, Dynamics of Gut Luminal Seeding, and Plasmid Transfer Plasmid transfer in Mouse Models Mouse models of Salmonellosis. 2021. **Book chapter in Bacterial Persistence: Methods and Protocols**. Doi: https://doi.org/10.1007/978-1-0716-1621-5_17 (* co-first authors)
16. Diard M, **Bakkeren E**, Lentsch V, Rocker A, Bekele NA, Hoces D, Aslani S, Arnoldini M, Boehi F, Schumann-Moor K, Adamcik J, Piccoli L, Lanzavecchia A, Stadtmueller BM, Donohue N, van der Woude MW, Hockenberry A, Viollier PH, Falquet L, Wuethrich D, Bonfiglio F, Loverdo C, Egli A, Zandomenighi G, Mezzenga R, Holst O, Meier BH, Hardt WD, Slack E. A rationally designed oral vaccine induces immunoglobulin A in the murine gut that directs the evolution of attenuated *Salmonella* variants. 2021. **Nat. Microbiol.** Doi: [10.1038/s41564-021-00911-1](https://doi.org/10.1038/s41564-021-00911-1)

17. Fattinger S, Geiser P, Ventayol PS, Di Martino ML, Furter M, Felmy B, **Bakkeren E**, Hausmann A, Barthel-Scherrer M, Gul E, Hardt WD, Sellin M. Epithelium-autonomous NAIP/NLRC4 prevents TNF-driven inflammatory destruction of the gut epithelial barrier in Salmonella-infected mice. 2021. *Mucosal Immunol*. Doi: <https://doi.org/10.1038/s41385-021-00381-y>

2020

18. **Bakkeren E**, Diard M, Hardt WD. Evolutionary causes and consequences of bacterial antibiotic persistence. 2020. *Nat. Rev. Microbiol*. Doi: [10.1038/s41579-020-0378-z](https://doi.org/10.1038/s41579-020-0378-z)
19. Benz F*, Huisman JS*, **Bakkeren E***, Herter JA, Stadler T, Ackermann M, Diard M, Egli A, Hall AR, Hardt WD, Bonhoeffer S. Plasmid-and strain-specific factors drive variation in ESBL-plasmid spread in vitro and in vivo. 2020. *ISME J*. Doi: [10.1038/s41396-020-00819-4](https://doi.org/10.1038/s41396-020-00819-4) (* co-first authors)
20. Hausmann A, Böck D, Geiser P, Berthold DL, Fattinger SA, Furter M, Bouman JA, Barthel-Scherrer M, Lang CM, **Bakkeren E**, Kolinko I, Diard M, Bumann D, Slack E, Regoes RR, Pilhofer M, Sellin ME, Hardt WD. Intestinal epithelial NAIP/NLRC4 restricts systemic dissemination of the adapted pathogen Salmonella Typhimurium due to site-specific bacterial PAMP expression. 2020. *Mucosal Immunol*. Doi: <https://doi.org/10.1038/s41385-019-0247-0>

2019

21. **Bakkeren E**, Huisman JS, Fattinger SA, Hausmann A, Furter M, Egli A, Slack E, Sellin ME, Bonhoeffer S, Regoes RR, Diard M, Hardt WD. Salmonella persists promote the spread of antibiotic resistance plasmids in the gut. 2019. *Nature*. Doi: [10.1038/s41586-019-1521-8](https://doi.org/10.1038/s41586-019-1521-8)
22. Wotzka SY, Kreuzer M, Maier L, Arnoldini M, Nguyen BD, Brachmann AO, Berthold DL, Zünd M, Hausmann A, **Bakkeren E**, Hoces D, Gül E, Beutler M, Dolowschiak T, Zimmermann M, Fuhrer T, Moor K, Sauer U, Typas A, Piel J, Diard M, Macpherson AJ, Stecher B, Sunagawa S, Slack E, Hardt WD. Escherichia coli limits Salmonella Typhimurium infections after diet shifts and fat-mediated microbiota perturbation in mice. 2019. *Nat. Microbiol*. Doi: <https://doi.org/10.1038/s41564-019-0568-5>

2017

23. **Bakkeren E**, Dolowschiak T, Diard MRJ. Detection of mutations affecting heterogeneously expressed phenotypes by colony immunoblot and dedicated semi-automated image analysis pipeline. 2017. *Front. Microbiol*. Doi: [10.3389/fmicb.2017.02044](https://doi.org/10.3389/fmicb.2017.02044)
24. Moor K, Diard M, Sellin M, Felmy B, Wotzka S, Toska A, **Bakkeren E**, Arnoldini M, Bansept F, Dal Co A, Völler T, Minola A, Fernandez-Rodriguez B, Agatic G, Barbieri S, Piccoli L, Casiraghi C, Corti D, Lanzavecchia A, Regoes RR, Loverdo C, Stocker R, Brumley DR, Hardt WD, Slack E. High-avidity IgA protects the intestine by enchainig growing bacteria. 2017. *Nature*. Doi: [10.1038/nature22058](https://doi.org/10.1038/nature22058)
25. Diard M, **Bakkeren E**, Cornuault JK, Moor K, Hausmann A, Sellin ME, Loverdo C, Aertsen A, Ackermann M, De Paepe M, Slack E, Hardt WD. Inflammation boosts bacteriophage transfer between Salmonella spp. 2017. *Science*. Doi: [10.1126/science.aaf8451](https://doi.org/10.1126/science.aaf8451)
26. Hu G, Caza M, **Bakkeren E**, Kretschmer M, Bairwa G, Reiner E, Kronstad J. A P4-ATPase subunit of the Cdc50 family plays a role in iron acquisition and virulence in Cryptococcus neoformans. 2017. *Cell. Microbiol*. Doi: <https://doi.org/10.1111/cmi.12718>

2015

27. Hu G, Caza M, Cadieux B, **Bakkeren E**, Do E, Jung WH, Kronstad JW. The endosomal sorting complex required for transport machinery influences haem uptake and capsule elaboration in Cryptococcus neoformans. 2015. *Mol. Microbiol*. Doi: <https://doi.org/10.1111/mmi.12985>
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