

Prof. Dr. Gabriele Berg

Research Statement

Fascinated by the microbial world, I am interested in discovering novel microbiomes and their functions, understanding rules of microbiome ecology and disentangling microbiome interplay with eukaryotic hosts. Moreover, I am working on developing sustainable microbiome management strategies for one and planetary health.

Academic Track Record

1981-1986	Studies in Biology (Ecology) at the University of Rostock (Diploma)
1986-1987	Research studies in Microbiology/Biotechnology at the University of Greifswald
1995	Dissertation, (Microbiology), Plant Sciences at the University of Rostock
2001	Habilitation/Venia legendi, Microbiology at the University of Rostock
2005-	Professor of Environmental Biotechnology, Graz University of Technology, Austria
2021-	Professor of Microbiome Management, ATB and University of Potsdam (20%)

Supervision PhD Students & Postdocs

I was supervisor of >30 completed PhDs and hosted >15 postdocs from Europe and beyond. My current international team consists of 7 PhD students and 8 postdocs and 12 master students.

Commissions of Board (selected)

- International Verticillium Steering Committee (2001 -)
- Head of the Working group “Biological control of plant diseases” DPG (2004-2012)
- Board member of the ÖGMBT (2009-2014)
- Member of the Senat of the TU Graz (2009-2022)
- Scientific board member of BioTechMed Graz (2017 -), ACIB Center (2015 – 2019)
- ERC Evaluator (2022-) and members of diverse national review panels
- Editorial Board member of several journals (Microbiome, Environmental Microbiome, ISME J)

Publication Profile

<https://scholar.google.at/citations?user=TeMrTQQAAAAJ&hl=de>

300+ publications in international peer-reviewed journals, including *Nature Microbiology*, *Nature Microbiology Reviews*, *Nature Communications*, *ISME Journal*, *Microbiome* and

Google Scholar: *h-index* 100, >36000 citations

Awards

Heisenberg Fellowship of the DFG (2003), Business Award Rostocker Kreis (2005), Science2Business Award Austria (2011), ÖGUT Umweltpreis (2011), Fast Forward Award Styria (2016), Frontiers Spotlight Award 2nd (2017), BioTechMed Award (2020), Nominated as Austrian Researcher of the year Top Five (2021), Forschungspreis des Landes Steiermark (2021), Ehrenkreuz für Wissenschaft and Kunst (Knight`s Cross) Styria (2022)

Career Path

Ground-breaking discoveries of the last two decades include:

- *The genotype-specific plant microbiome was shaped by plant-microbiota coevolution* (Smalla et al. 2001; Berg et al. 2002; Berg & Smalla 2009, Cardinale et al. 2015). First evidence for specificity of the entire microbiota by microbiome fingerprints and functional analysis
- *Beneficial plant-associated endophytes are vertically transmitted by spores and seeds* (Bragina et al. 2012; Berg & Raaijmakers 2018, Bergna et al. 2019). First discovery for mosses and seed plants
- *Archaea are functional components of plant microbiomes* (Taffner et al. 2018). First evidence for plant beneficial functions by metagenome analysis
- *Apples harbour 100 million diverse bacteria* (Wassermann et al. 2019). Game-changing for the public, and belong to the top 5% of all research outputs ever tracked by Altmetric
- *The response of holobionts to abiotic stress is mediated by bacteria* (Cernava et al. 2019). Metatranscriptomics results indicate an intense interplay in holobiont functioning under drought stress
- *Single key stone bacterial species can cause plant health - soterobionts* (Matsumoto et al. 2019; Cernava & Berg 2022). A new concept – the opposite of a pathogen exists
- *The plant microbiota signature of the Anthropocene is a future challenge* (Berg & Cernava 2022). First summary of synergistic man-made impact
- *The plant microbiome is cross-linked* with other environmental and the human microbiomes; these interfaces are less understood and in focus of her current research.
- *The plant rhizosphere is a reservoir for emerging human pathogenic bacteria* (Berg et al. 1999; Berg et al. 2005; Oberauner et al. 2013). First hypothesis and evidence for nosocomial infections from bacteria of plant origin in humans
- *Man-made antimicrobial resistance in built environments* (Mahnert et al. 2019). Loss of microbial diversity correlates with an increase in antimicrobial resistance – important evidence, which has too little attention in everyday life?
- *Harnessing the microbiome to prevent global biodiversity loss* (Peixoto et al. 2022). First concept spanning plants, wildlife and entire ecosystems

Publications (within past 5 years, selected)

- Mahnert A, Moissl-Eichinger C, Zojer M, Bogumil D, Mizrahi I, Rattei T, Martinez JL, **Berg G** (2019). Man-made microbial resistances in built environments. *Nature Communication* 10: 968.
- Berg G**, Rybakova D, Fischer D, Cernava T, Vergès MC, Charles T, Chen X, Cocolin L, Eversole K, Corral GH, Kazou M, Kinkel L, Lange L, Lima N, Loy A, Macklin JA, Maguin E, Mauchline T, McClure R, Mitter B, Ryan M, Sarand I, Smidt H, Schelkle B, Roume H, Kiran GS, Selvin J, Souza RSC, van Overbeek L, Singh BK, Wagner M, Walsh A, Sessitsch A, Schlöter M (2020). Microbiome definition re-visited: old concepts and new challenges. *Microbiome*. 8:103.
- Matsumoto H, Fan X, Wang Y, Kusstatscher P, Duan J, Wu S, Chen S, Qiao K, Wang Y, Ma B, Zhu G, Hashidoko Y, **Berg G**, Cernava T, Wang M (2021). Bacterial seed endophyte shapes disease resistance in rice. *Nature Plants* 7: 60-72.
- Berg G**, Cernava T (2022). The plant microbiota signature of the Anthropocene as a challenge for microbiome research. *Microbiome* 10: 54.
- Peixoto RS, Voolstra CR, Sweet M, Duarte CM, Carvalho S, Villela H, Lunshof JE, Gram L, Woodhams DC, Walter J, Roik A, Hentschel U, Thurber RV, Daisley B, Ushijima B, Daffonchio D, Costa R, Keller-Costa T, Bowman JS, Rosado AS, Reid G, Mason CE, Walke JB, Thomas T, **Berg G** (2022). Harnessing the microbiome to prevent global biodiversity loss. *Nature Microbiology* doi: 10.1038/s41564-022-01173-1.
- Wicaksono W, Braun M, Bernhardt J, Riedel K, Cernava T, **Berg G** (2022). Trade-off for survival: Microbiome response to chemical exposure combines activation of intrinsic resistances and adapted metabolic activity, *Environment International*, 168. doi.org/10.1016/j.envint.2022.107474

Other Scientific Output and Impact

1. Patents, which are commercialized by the university (PCT/EP2018/075760) and industry (PCT/EP2008/058546; EP 10 196 672.9)
2. 20+ keynote, invited lectures and invited seminars each year
3. Combinations of art & science: exhibitions with different artists (e.g. Barbara Raic, Timothy Mark) Sparkling Science projects “microbiome 4 future” (<https://microbiome4future.tugraz.at/>).
4. Innovative science is also reflected in the online course (MOOC, Massive Open Online Course) “Microbiome & Health” at IMOOX, which already has more than 14,000 participants (<https://imoox.at/mooc/local/landingpage/course.php?shortname=microbiome&lang=en>).