RUTH SCHMIDT, PHD

Microbial Ecologist & Data Scientist

A dynamic and resourceful microbial ecologist with 8 years of experience in microbiome research, data analysis and science communication, with strong leadership and a broad set of technical and interpersonal skills.

Currently searching for a data science position at the intersection of research and sustainability that allows me to build tools using visualization and statistics to better understand and explore data and turn them into action.

EDUCATION

10/2017 **Ph.D. in Microbial Ecology**
Wageningen University & Netherlands Institute of Ecology (NIOO)
Title: Volatile communication between fungi and bacteria
Wageningen, The Netherlands

12/2012 **M.S. in Biotechnology**
Graz University of Technology
Graz, Austria

09/2010 **B.Sc. in Molecular Biology**
Graz University of Technology
Graz, Austria

PROFESSIONAL EXPERIENCE

01/2020 | 10/2020 **Data Scientist (Mitacs Fellowship)**
Plotly Technologies
Montréal, Canada
- Developed open-source visualization apps for omics data in microbiome research using Plotly's Dash R and Dash Bio libraries.
- Presented workflow and examples of Dash apps for omics data at Bioconductor 2020 (link to slides)

07/2019-10/2019 **Consultant**
International Union for Conservation of Nature (IUCN)
remote
- Contributed to a global report on soil biodiversity in agro-ecosystem health.

ACADEMIC EXPERIENCE

01/2020 | 03/2020 **JSPS Visiting Fellow**
Kochi Core Center
Kochi, Japan
- Developed PCR-based screening method for detection of terpene synthase genes (TPS) across terrestrial and aquatic environments.
- Performed amplicon sequencing of PCR products and bioinformatics data analysis.

CONTACT INFO

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github.com/ruthlys

TECHNICAL SKILLS

Highly experienced in: R programming, Dash for R & Dash Bio
Experience with: Python, CSS & HTML, Git, Linux/UNIX
Multivariate statistics, statistical models & machine learning
Molecular biology techniques, bioinformatics/omic technologies & data analysis
Data cleaning, processing, manipulation & visualization (ggplot2, Plotly graphing libraries)

INTERPERSONAL SKILLS

Excellent communicator
Highly creative
Problem solver
Strong team player & collaborative

LANGUAGES

German (Native)
English (Fluent)
Spanish (Advanced)
French (Beginner)

02/2018 | 12/2019

Postdoctoral Fellow
Institut national de la recherche scientifique (INRS), Labo Yergeau — Montréal, Canada

- Research on microbial solutions to drought in agriculture.
- Led lab and field studies with wheat under drought conditions.
- Conducted analysis of omic data (quantitative metagenomics, metatranscriptomics, metabolomics).
- Co-supervised 4 PhD students and 2 Master students.
- Presented findings at 6 international conferences.
- Collaborated with researchers in The Netherlands (Netherlands Institute of Ecology) & UK (Plymouth Marine Laboratory).

02/2013 | 10/2018

PhD Candidate
Netherlands Institute of Ecology & Wageningen University, Garbeva Group — Wageningen, The Netherlands

- Characterized molecular mechanism underlying volatile interaction in soil microbes using a combination of omic, microbiological, and analytical (GC-MS) approaches.
- Analyzed omic data (proteomics, metabolomics) and developed workflow for metabolomic data analysis.
- Mentored 4 undergraduate and 1 graduate student on molecular biology research projects.
- Collaborated with international research institutes and universitites in Germany (Max-Planck Institute for Chemical Ecology, Jena & Center for Functional Genomics of Microbes, Greifswald), US (Institute for Genome Sciences, Baltimore) & Sweden (Swedish University of Agricultural Sciences) on genomics and proteomics projects.

10/2010- 12/2012

University assistant
Graz University of Technology — Graz, Austria

- Led and conducted field study on the effect of biocontrol agents in field in Egypt.
- Performed analysis of 16S rRNA sequencing data, and measurement and analysis of analytical data (LC-MS).

TEACHING EXPERIENCE

09/2015 — **Instructor in two days hands-on course on proteomics**
Netherlands Institute of Ecology — Wageningen, The Netherlands

10/2013 — **Teaching Assistant in Laboratory Course in Environmental Biotechnology**
Graz University of Technology — Graz, Austria

06/2012 — **Research Assistant in Laboratory Course in Biochemistry and Molecular Biology**
Karl-Franzens University — Graz, Austria

GRANTS & AWARDS

2019 — **Mitacs Postdoctoral Fellowship (60,000 CAD)**
Visualization of multi-omics data in microbiome research — Montréal, Canada

2019 — **Japan Society for the Promotion of Science (JSPS) Award (8,000 CAD)**
Uncovering microbial chemical ecology in the extreme sub-seafloor environment — Kochi Core Centre, Japan

2019 — **Coalesce BioArt residency (2,000 USD)**
Microbial Scents and Olfactory Prosthesis for the Future — Coalesce: Center for Biological Art, University at Buffalo, USA

2018 — **Quebec Centre for Biodiversity Science (QCBS) Travel grant (1,500 CAD)**
International Phytobiome meeting — Montpellier, France

2018 — **QCBS Seed grant (5,000 CAD)**
Aural soilscapes: creating ecological consciousness to global warming — Montréal, Canada

2018 — **QCBS Travel grant (1,500 CAD)**
ISME17 meeting — Leipzig, Germany

2017 **International Society of Chemical Ecology (ISCE) Travel Grant (1,000 USD)**
Annual Meeting ISCE17 — Kyoto, Japan

2017 **Best Talk Award (150 USD)**
Annual Meeting ISCE17 — Kyoto, Japan

2017 **Federation of European Microbiological Societies (FEMS) Research Grant (5,000 Eur)**
Research on fungal genomics at the Swedish University of Agricultural Sciences (SLU) — Uppsala, Sweden

2016 **International Society for Microbial Ecology (ISME) Travel Grant (800 Eur)**
ISME16 meeting — Montréal, Canada

2015 **FEMS Meetings Attendance Grant (300 Eur)**
Ecology of Soil Microorganisms meeting — Prague, Czech Republic

2015 **Best Poster Award (100 Eur)**
Ecology of Soil Microorganisms meting — Prague, Czech Republic

PRESENTATIONS

07/2020 **Bioconductor 2020 (talk)**
Interactive data visualization in microbiome research with Dash R & Dash Bio (link to slides) — Boston, USA (virtual)

06/2020 **INRS Seminar series (talk)**
Nitrapyrin effects on soil microbial community structure, composition, diversity & function (link to slides with interactive graphs)
Montréal, Canada

02/2020 **Kochi Core Center (talk)**
Uncovering microbial terpenes in the extreme sub-seafloor environment. — Kochi, Japan

06/2019 **International Society of Chemical Ecology, ISCE 35 (talk)**
Microbial chemical ecology: past, present and future. — Atlanta, USA

05/2019 **Second International Holobiont meeting (talk)**
How microbial volatiles help plants survive in times of drought. — Montréal, Canada

12/2018 **Quebec Centre for Biodiversity Science Annual Symposium (talk)**
Microbial aromas might help plants survive drought. — Montréal, Canada

12/2018 **International Phytobiomes Conference (poster)**
Microbial terpenes in the plant holobiont as a strategy to adapt to drought. — Montpellier, France

08/2018 **International Symposium on Microbial Ecology, ISME 17 (talk)**
Do bacteria and fungi have a fragrant language all their own? — Leipzig, Germany

08/2018 **International Symposium on Microbial Ecology, ISME 17 (speaker in roundtable session)**
Microbial chemical ecology: intra- and interspecies communication. — Leipzig, Germany

06/2018 **Champalimaud Centre for the Unknown**
Microworld - the most powerful life on earth. — Lisbon, Portugal

08/2017 **International Society of Chemical Ecology, ISCE 34 (talk)**
Terpenes as *lingua franca* between fungi and bacteria. — Kyoto, Japan

08/2016 **International Symposium on Microbial Ecology, ISME 16 (poster)**
Transcriptional responses of a beneficial soil bacterium to volatiles of a plant pathogen. — Montréal, Canada

12/2015 **Ecology of soil microorganisms, ESM (poster)**
Microbial small talk: Volatiles in fungal-bacterial interactions. — Prague, Czech Republic

04/2014 **4th International student conference on Microbial Communication, MiCom (talk)**
Chemical dialogues: The ability of bacteria to sense fungal volatiles. — Jena, Germany

12/2013 **CNRS-Jacques Monod conference: bacterial–fungal interactions: a federative field for fundamental and applied microbiology**
The role of fungal volatiles as signaling compounds in bacterial-fungal interactions. Roscoff, France

06/2013 **Boston Bacterial Meeting, BBM (poster)**
Microbial interactions via secondary metabolites in soil. Boston, USA

02/2013 **Netherlands Annual Ecology Meeting, NERN (poster)**
The best bacterial competitive strategies in the rhizosphere. Lunteren, The Netherlands

PUBLICATIONS

2020 **Field H_2 infusion alters bacterial and archaeal communities but not fungal communities nor nitrogen cycle gene abundance.**
Soil Biol. Biochem. DOI: 10.1016/j.soilbio.2020.108018
Wang X., **Schmidt R.**, Constant P., & Yergeau E.

2020 **Infochemicals in terrestrial plants and seaweed holobionts: current and future trends.**
New Phytologist. DOI: 10.1111/nph.16957
Schmidt R., & Saha, M.

2020 **Nitrapyrin has far reaching effects on the soil microbial community structure, composition, diversity and functions (submitted).**
biorxiv. DOI: 10.1101/2020.07.21.205765
Schmidt R., Wang X., Garbeva, P., & Yergeau E.

2020 **A Gaseous Milieu: Extending the Boundaries of the Rhizosphere.**
Trends in microbiology. DOI: 10.1016/j.tim.2020.02.016
de la Porte, A., **Schmidt, R.**, Yergeau, É., & Constant, P.

2019 **Microbe-driven chemical ecology: past, present and future.**
ISME J. DOI: 10.1038/s41396-019-0469-x
Schmidt, R., Ulanova, D., Wick, L. Y., Bode, H. B., & Garbeva, P.

2018 **Deciphering the genome and secondary metabolome of the plant pathogen *Fusarium culmorum*.**
FEMS Microbiol Ecol. DOI: 10.1093/femsec/fiy078
Schmidt, R., Durling, M. B., de Jager, V., Menezes, R. C., Nordkvist, E., Svatoš, A., Dubey, M., Lauterbach, L., Dickschat, J. S., Karlsson, M., & Garbeva, P.

2018 **Fifty Percent Human - how art brings us in touch with our microbial cohabitants.**
Microb Biotechnol.DOI: 10.1111/1751-7915.13285
Bäumel, S., Tytgat, H., Nemec, B., **Schmidt, R.**, Chia, L. W., & Smidt, H.

2018 **The future of ecology is collaborative, inclusive and deconstructs biases.**
Nat Ecol Evol. DOI: 10.1038/s41559-017-0445-7
Ramirez, K. S., Berhe, A. A., Burt, J., Gil-Romera, G., Johnson, R. F., Koltz, A. M., Lacher, I., McGlynn, T., Nielsen, K. J., **Schmidt, R.**, Simonis, J. L., terHorst, C. P., & Tuff, K.

2017 **Fungal volatile compounds induce production of the secondary metabolite Sodorifen in *Serratia plymuthica* PRI-2C.**
Sci Rep. DOI: 10.1038/s41598-017-00893-3
Schmidt, R., Jager, V., Zühlke, D., Wolff, C., Bernhardt, J., Cankar, K., Beekwilder, J., Ijcken, W. V., Sleutels, F., Boer, W., Riedel, K., & Garbeva, P.

2016 **Controlling the Microbiome: Microhabitat Adjustments for Successful Biocontrol Strategies in Soil and Human Gut.**
Front Microbiol. DOI: 10.3389/fmicb.2016.01079
Adam, E., Groenenboom, A. E., Kurm, V., Rajewska, M., **Schmidt, R.**, Tyc, O., Weidner, S., Berg, G., de Boer, W., & Falcão Salles, J.

2016 **Microbial Small Talk: Volatiles in Fungal-Bacterial Interactions.**
Front Microbiol. DOI: 10.3389/fmicb.2015.01495
Schmidt, R., Etalo, D. W., de Jager, V., Gerards, S., Zweers, H., de Boer, W., & Garbeva, P.

2016 **Volatile affairs in microbial interactions.**
ISME J. DOI: 10.1038/ismej.2015.42
Schmidt, R., Cordovez, V., de Boer, W., Raaijmakers, J., & Garbeva, P.

2015 **Exploring the genomic traits of fungus-feeding bacterial genus *Collimonas*.**
BMC Genomics. DOI: 10.1186/s12864-015-2289-3
Song, C., **Schmidt, R.**, de Jager, V., Krzyzanowska, D., Jongedijk, E., Cankar, K., Beekwilder, J., van Veen, A., de Boer, W., van Veen, J. A., & Garbeva, P.

2014 **Effects of bacterial inoculants on the indigenous microbiome and secondary metabolites of chamomile plants.**
Front Microbiol. DOI: 10.3389/fmicb.2013.00400
Schmidt, R., Köberl, M., Mostafa, A., Ramadan, E. M., Monschein, M., Jensen, K. B., Bauer, R., & Berg, G.

2013 **The microbiome of medicinal plants: diversity and importance for plant growth, quality and health.**
Front Microbiol. DOI: 10.3389/fmicb.2014.00064
Köberl, M., **Schmidt, R.**, Ramadan, E. M., Bauer, R., & Berg, G.

PRESS AND OUTREACH (EXCERPT)

2020 **How to give life to your microbiome data.**
Towards Data Science.

2019 **Microbial aromas could save agriculture from climate change.**
The Conversation.

2018 **The Art of Microbial Communication.**
SciArt Magazine.

2017 **World's most spoken language is 'Terpene'.**
Science Daily.

PROFESSIONAL MEMBERSHIPS

2018 | 2020 **Quebec Centre for Biodiversity Science (QCBS)**
Coordinated workshops and EDI training. Montréal, Canada

2017 | 2019 **500 Women Scientists**
Coordinated partnerships with other non-profit organizations aimed at making science more inclusive and accessible. global

2017 | 2019 **International Society for Microbial Ecology (ISME)**
Organized outreach campaigns, microbial ecology workshops and conference meetings. global

REFERENCES

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