

## Stephanie A. Eichorst, Ph.D.

Division of Microbial Ecology

Department of Microbiology and Ecosystem Science

Research network Chemistry meets Microbiology

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## Main Research Interest

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- Microbial mediated cellulose degradation
- Ecophysiology of acidobacteria
- Single-cell method development for work in complex systems, such as soils

## Scientific experience

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2012-present	<b>Scientist</b> , Division of Microbial Ecology, University of Vienna, Vienna, Austria.
2011	<b>Postdoctoral fellow</b> , Joint BioEnergy Institute, Emeryville, CA USA. PI: Steven W. Singer PhD.
2007-2010	<b>Postdoctoral fellow</b> , Los Alamos National Laboratory, Bioscience Division, Los Alamos, NM USA. PI: Cheryl R. Kuske PhD.
2007-2008	<b>Course coordinator</b> , Microbial Diversity Course, Woods Hole, Massachusetts, USA. Course Directors: Prof. Thomas M. Schmidt & Prof. William Metcalf.
2007	<b>Postdoctoral fellow</b> , Michigan State University. PI: Prof Thomas M. Schmidt.
2001-2007	<b>PhD Student</b> : Microbiology and Molecular Genetics, College of Natural Science, Michigan State University, East Lansing, MI, USA. Advisors: Prof. Thomas M. Schmidt and Prof. John A. Breznak.
1996-2000	<b>Bachelor of Science</b> , Benedictine University, Lisle, IL USA.
1998-2000	<b>Undergraduate researcher</b> at Benedictine University, Lisle, IL USA.
1996-2000	<b>Undergraduate lab student technician</b> , Biology department, Benedictine University, Lisle, IL USA.

## Degrees

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2007	<b>PhD</b> : Microbiology and Molecular Genetics, College of Natural Science, Michigan State University, East Lansing, MI, USA. Dissertations "Isolation and characterization of members of the phylum <i>Acidobacteria</i> from soils" Advisors: Prof. Thomas M. Schmidt and Prof. John A. Breznak. Graduated with Cum Laude (GPA 3.6/4.0).
2000	<b>Bachelor of Science</b> , Benedictine University, Lisle, IL USA. Graduated Magna Cum Laude (GPA 3.9/4.0).

## Peer-reviewed third-party funding

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- **Project grant**: *Investigating the function of the ubiquitous Acidobacteria in terrestrial environments*. Funded by the "FWF – Der Wissenschaftsfonds" (Austrian Science Fund), project No. P 26392-B20 (435,698 €) (Co-PI with Dr. Dagmar Woebken), 2014-2017

- **Project grant:** *A functional approach to understand active non-symbiotic diazotrophs in soil*. Funded by the “FWF – Der Wissenschaftsfonds” (Austrian Science Fund), project No. P 25700- B20 (448,751 €) (Co-PI with Dr. Dagmar Woebken), 2013-2016
- **Project grant:** *NanoSIMS enabled approach to understand bacterial and fungal cellulose degraders in soils*. Marie Curie International Incoming Fellowship (IIF), fellow Dr. Stephanie A. Eichorst. Funded by Marie Curie FP7 (EU), project No. 300807 (180,191 €) (Host: Prof. Michael Wagner), 2012-2014
- **Community Sequencing Proposal**, Joint Genome Institute. *Populating the branches of the Phylum Acidobacteria with relevant soil strains*, 2010.
- **Kellogg Biologics Station Long Term Ecological Research Grant**. (\$1,200), 2003.
- **Howard Hughes Medical Institute (HHMI)** Undergraduate Summer Research Award, Benedictine University, Lisle, IL, 1998-1999.

## Other scientific activities

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- Ad-hoc reviewer:** Applied and Environmental Microbiology, FEMS Microbiology Ecology, Canadian Journal of Microbiology, Microbial Ecology, Environmental Microbiology, International Journal of Systematic and Evolutionary Microbiology, Frontiers in Terrestrial Microbiology
- Review Editor:** Frontiers in Terrestrial Microbiology

## Academic prizes and awards

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| 2012 | Marie Curie FP7 (EU), <i>NanoSIMS enabled approach to understand bacterial and fungal cellulose degraders in soils</i> . Marie Curie International Incoming Fellowship (IIF) (180,191 €) |
| 2007 | Michigan State University, Rudolph Hugh Scholarship for academic achievement (\$2000)  |

## Invited presentations

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| 2011       | Department of Energy, Joint BioEnergy Institute, Emeryville, CA, USA                 |
| 2010       | Los Alamos National Laboratory, Bioscience Division, Los Alamos, NM, USA             |
| 2009       | Argonne National Laboratory First Annual Soil Metagenomics Workshop, Argonne, IL USA |
| 2007       | Los Alamos National Laboratory, Bioscience Division, Los Alamos, NM, USA             |
| 2007, 2008 | Microbial Diversity Course, Marine Biological Laboratory, Woods Hole, MA, USA        |

## Publications

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### 2016

Spohn, M., E.M. Pötsch, **S.A. Eichorst**, D. Woebken, W. Wanek, A. Richter. 2016. Soil microbial carbon use efficiency and biomass turnover in a long-term fertilization experiments in a temperate grassland. *Soil Biol. Biochem.* 97: 168-175.

### 2015

**Eichorst, S.A.**, F. Strasser, T. Woyke, A. Schintlmeister, M. Wagner, and D. Woebken. 2015. Advancements in the application of NanoSIMS and Raman microspectroscopy to investigate the activity of microbial cells in soils. *FEMS Microbiology Ecology*: 91(10); pii: fiv106.

Hiras, J.\*, Y.W. Wu\*, **S.A. Eichorst**, B.A. Simmons, S.W. Singer. 2015. Refining the phylum *Chlorobi* by resolving the phylogeny and metabolic potential of the representative of a deeply branching, uncultivated lineage. *ISME Journal*, 10(4): 833-845. \*denotes co-first authorship

Wu, Y., C. Joshua, **S.A. Eichorst**, J.M. Gladden, B.A. Simmons and S.W. Singer. 2015. Genomic analysis of xylose metabolism in members of the Deinococcus-Thermus phylum from thermophilic biomass-deconstructing bacterial consortia. *Bioenergy Research*. 8(3): 1031-1038.

#### 2014

**Eichorst, S.A.**, C. Joshua, N. Sathitsuksanoh, S. Singh, B.A. Simmons, and S.W. Singer. 2014. Substrate-specific development of thermophilic bacteria consortia using chemically pretreated switchgrass. *Applied and Environmental Microbiology*. 80(23): 7423-7432.

Berthrong, S., C.M. Yeager, L. Gallegos-Graves, B. Steven, **S.A. Eichorst**, R.B. Jackson and C.R. Kuske. 2014. Nitrogen fertilization has a stronger effect on soil N-fixing bacterial communities than elevated atmosphere CO<sub>2</sub>. *Applied and Environmental Microbiology*. 80(10): 3103-3112.

#### 2013

**Eichorst, S.A.**, P. Varanasi, V. Stalvia, M. Zemla, M. Auer, S. Singh, B.A. Simmons, and S.W. Singer. 2013. Community dynamics of cellulose-adapted thermophilic bacterial consortia. *Environmental Microbiology*. 15(9): 2573-2587.

#### 2012

**Eichorst, S.A.** and C.R. Kuske. 2012. Identification of cellulose-responsive bacterial and fungal communities in geographically and edaphically different soils by using stable isotope probing. *Applied and Environmental Microbiology* 78:2316-2327.

Gladden, J.M., **S.A. Eichorst**, T.C. Hazen, B.A. Simmons, and S.W. Singer. 2012. Substrate perturbation alters the glycoside hydrolase activities and community composition of switchgrass-adapted bacterial consortia. *Biotechnology and Bioengineering*. 109(5): 1140-1145.

Dunbar, J.M., **S.A. Eichorst**, L. Gallegos-Graves, S. Silva, G. Xie, N.W. Hengartner, R.D. Evans, B.A. Hungate, R.B. Jackson, J.P. Megonigal, C.W. Schadt, R. Vilgalys, D.R. Zak, and C.R. Kuske. 2012. Common bacterial responses in six ecosystems exposed to ten years of elevated atmospheric carbon dioxide. *Environmental Microbiology*. 14:1145-1158.

Gans, J.D., J. Dunbar, **S.A. Eichorst**, L. Gallegos-Graves, M. Wolinsky, and C.R. Kuske. 2012. A robust platform for design of PCR-based nucleic acid assays applied to the construction of *Acidobacteria* group 1-specific assays. *Nucleic Acids Research* 40(12), e96.

Liu, KL, A. Porras-Alfaro, C.R. Kuske, **S.A. Eichorst**, and G. Xie. 2012. Accurate, rapid taxonomic classification of fungal large-subunit rRNA genes. *Applied and Environmental Microbiology* 78:1523-1533.

#### Before 2012

**Eichorst, S.A.**, C.R. Kuske, and T.M. Schmidt. 2011. Influence of plant polymers on the distribution and cultivation of bacteria in the phylum *Acidobacteria*. *Applied and Environmental Microbiology* 77:586-596.

Challacombe, J.F., **S.A. Eichorst**, L. Hauser, M. Land, G. Xie, and C.R. Kuske. 2011. Biological consequences of ancient gene acquisition and duplication in the large genome of *Candidatus Solibacter usitatus* Ellin6076. *PLoS One*. 6(9): e24882.

**Eichorst, S.A.**, J.A. Breznak, and T.M. Schmidt. 2007. Isolation and characterization of bacteria from soil that define *Terriglobus* gen. nov., in the phylum *Acidobacteria*. *Applied and Environmental Microbiology* 73:2708-2717.

Stevenson, B.S., **S.A. Eichorst**, T.M. Schmidt, and J.A. Breznak. 2004. New strategies for cultivation and detection of previously uncultured microbes. *Applied and Environmental Microbiology*. 70(8): 4748-4755.

## Book chapters and other publications

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**Eichorst S.A. and D. Woebken.** 2014. Investigation of microorganisms at the single-cell level using Raman Microspectroscopy and Nanometer-scale Secondary Ion Mass Spectrometry. *In* Molecular Methods and Applications in Microbiology, in press. (Skovhus, T.L., Caffrey, S., and Hubert, C.R.J., ed.). Caister Academic Press, Norfolk, UK.

## Contributions to international conferences

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**Eichorst, S.A.,** 2016. Exploring the niches of cellulose degradation in a forested soil – from process to the single-cell scale. ISME 16, Montreal, Canada. Contributed Oral Presentation.

Strasser, F., **S.A. Eichorst,** L. Fuchslueger, J. Schnecker, M. Watzka, A. Richter, D. Woebken 2015. Influences of carbon substrates and nitrogen availability on microbial-mediated cellulose degradation in an Austrian beech forest soil. Ecology of Soil Microorganisms. Poster presentation.

Trojan, D., **S.A. Eichorst,** C. Herbold, T. Rattei, D. Woebken 2015. Investigating the ecophysiology of the ubiquitous Acidobacteria in the dynamic soil environment. Ecology of Soil Microorganisms. Poster presentation.

Angel, R., R. Gabriel, **S.A. Eichorst,** C. Herbold, T. Rattei, D. Woebken 2015. Optimizing the toolbox to investigate free-living diazotrophs in soil – from bulk measurements to single-cell analysis. Ecology of Soil Microorganisms. Poster presentation.

**Eichorst, S.A.,** F. Strasser, L. Fuchslueger, J. Schnecker, M. Watzka, A. Richter, D. Woebken 2014. Temporal patterns and edaphic drivers in microbial cellulose degradation in an Austrian beech forest soil. ISME 15, Seoul, South Korea. Poster presentation.

**Eichorst, S.A.,** F. Strasser, T. Woyke, A. Schintlmeister, M. Wagner, D. Woebken. 2014. One Cell at a Time: Advancements on the application of single-cell methods, NanoSIMS and Raman microspectroscopy, in terrestrial environments. ISME 15, Seoul, South Korea. Poster presentation.

**Eichorst, S.A.** 2014. Investigating microbial cellulose degradation in an Austrian beech forest soil – from the process to the single-cell level. DGB Workshop – Soil Processes – is the whole system regulated at ‘hot spots’? From micro-scales to the pedon.” Freising, Germany. Oral Presentation.

**Eichorst, S.A.,** F. Strasser, T. Woyke, A. Schintlmeister, M. Wagner, D. Woebken. 2013. Understanding the Edaphic Drivers of Cellulose-Degrading Guilds in an Austrian Beech Forest Soil. 2<sup>nd</sup> Thünen Symposium on Soil Metagenomics. Thünen, Germany. Poster presentation.

**Eichorst, S.A.,** J.M. Gladden, M. Allgaier, P. D’haeseleer, T.C. Hazen, J.S. VanderGheynst, P. Hugenholtz, B.A. Simmons, S.W. Singer. 2011. Glycoside Hydrolase Activities and Community Composition of Feedstock-Adapted Thermophilic Bacterial Consortia. Gordon Research Conference, Applied and Environmental Microbiology. Poster presentation.

**Eichorst, S.A.** 2010. Identification of active bacterial and fungal cellulolytic communities in soils. Joint BioEnergy Institute, Deconstruction/Microbial Communities Division. Invited Seminar.

**Eichorst, S.A.,** C.R. Kuske. 2010. Identification of active bacterial and fungal cellulolytic communities using stable isotope probing and in-depth rDNA sequencing across pine forest soils. ISME 13, Seattle, Washington USA. Poster presentation.

Kuske, C.R., J. Dunbar, G. Xie, L. Ticknor, **S.A. Eichorst,** L. Gallegos-Graves, S. Silva, C. Weber, D. Zak, R. Vilgalys, C. Schadt, D. Evans, P. Megonigal, B. Hungate, R. Jackson, A. Porras-Alfaro, S. Tringe. 2010. Responses of soil bacterial and fungal communities to long term elevated carbon dioxide and other environmental factors in six terrestrial ecosystems. ISME 13, Seattle, Washington USA. Poster presentation.

Lui, K.L., G. Xie, A. Porras-Alfaro, **S.A. Eichorst,** N. Hengartner, C.R. Kuske. 2010. Curated LSU rRNA and ITS database and a fungal classifier for short read sequences. ISME 13, Seattle, Washington USA. Poster presentation.

Kuske, C.R., J. Dunbar, L. Ticknor, **S.A. Eichorst**, D. Zak, R. Vilgalys, C. Schadt, D. Evans, P. Megonigal, B. Hungate, R. Jackson. 2010. Spatial variability and influence of edaphic factors on biogeographic patterns in soil communities within and across six terrestrial biomes. ISME 13, Seattle, Washington USA. Poster presentation.

**Eichorst, S.A.**, J.F. Challacombe, N. Ward, T.M. Schmidt, C.R. Kuske. 2008. Genomic and physiological description of subdivision 1 and 3 in the phylum *Acidobacteria*. ASM 108<sup>th</sup> General Meeting, Boston, Massachusetts, USA. Poster presentation.

J.F. Challacombe, G. Xie, **S.A. Eichorst**, T.S. Brettin, C.R. Kuske. 2008. Factors contributing to the large genome of the soil bacterium *Solibacter usitatus*. ASM 108<sup>th</sup> General Meeting, Boston, Massachusetts, USA. Poster presentation.

**Eichorst, S.A.**, J.F. Challacombe, N. Ward, T.M. Schmidt, C.R. Kuske. 2008. Genomic and physiological description of subdivision 1 and 3 in the phylum *Acidobacteria*. Department of Energy, Los Alamos National Laboratory, Bioscience, Biosecurity, and Cognitive Science Capability Review, Los Alamos, USA. Poster presentation, award winner.

Z.M.P. Lee, **S.A. Eichorst**, T.M. Schmidt. 2007. Exploring the Effect of Variation in Translational Machinery on Bacterial Growth Efficiency. ASM 107<sup>th</sup> General Meeting, Toronto, Canada. Poster presentation.

**Eichorst, S.A.**, J.A. Breznak, T.M. Schmidt. 2005. Isolation and Characterization of Carotenoid Containing Strains of the Phylum *Acidobacteria* from Soil. ASM 105<sup>th</sup> General Meeting, Atlanta, Georgia, USA. Poster presentation.

**Eichorst, S.A.**, B. Stevenson, D. Engles, T.M. Schmidt, J.A. Breznak. 2003. Methanol-Induced Shifts in Acidobacterium Diversity and Isolation of a Novel Acidobacterium from Soil. LTER All-Investigator Meeting, East Lansing, USA. Poster presentation.

**Eichorst, S.A.**, B. Stevenson, D. Engles, T.M. Schmidt, J.A. Breznak. 2003. Methanol-Induced Shifts in Acidobacterium Diversity and Isolation of a Novel Acidobacterium from Soil. ASM 103<sup>rd</sup> General Meeting Washington, DC, USA. Poster presentation.

B. Stevenson, **S.A. Eichorst**, J. Wertz, T.M. Schmidt, J.A. Breznak. 2003. Plate Wash PCR: A method to streamline the isolation of novel organisms. ASM 103<sup>rd</sup> General Meeting Washington, DC, USA. Poster presentation.

## Public Outreach

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**University of Vienna, KinderUni.** 2014-current. Summer Workshop entitled "What would the world look like without microbes? Adventures into the microbial world". (<https://www.kinderuni.at/kinderuniwien/>)

**American International School** – 3-day workshop for school children entitled "An Underground Adventure. Dirt – The Scoop on Soil". (<http://www.ais.at/>)

## Collaboration partners

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Dr. Dagmar Wobken	Division of Microbial Ecology, Research, Department of Microbiology and Ecosystem Science, University of Vienna, Vienna, Austria
Prof. Dr. Andreas Richter	Division of Terrestrial Ecosystem Research, Department of Microbiology and Ecosystem Science, University of Vienna, Vienna, Austria
Assoc. Prof Dr. Wolfgang Wanek	Division of Terrestrial Ecosystem Research, Department of Microbiology and Ecosystem Science, University of Vienna, Vienna, Austria

Assoc. Prof Dr. Alexander Loy

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