

Dr Jillian M. Petersen

Assistant Professor

University of Vienna

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Division of Microbial Ecology

Research Network Chemistry meets Microbiology

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Career

2015 – current	Assistant Professor (tenure track), Division of Microbial Ecology, University of Vienna
2013 - 2015	Senior scientist, Symbiosis Department, Max Planck Institute for Marine Microbiology
2013	Maternity leave
2009 – 2013	Postdoctoral researcher, Symbiosis Group, Max Planck Institute for Marine Microbiology
2010 – 2011	Maternity leave
2003 – 2004	Undergraduate scientist, Advanced Wastewater Management Center, University of Queensland, Australia

Education

2009	Dr. rer. nat. (magna cum laude), University of Bremen and Max Planck Institute for Marine Microbiology, Bremen, Germany <i>Thesis title: "Diversity and Ecology of Chemosynthetic Symbioses in Deep-Sea Invertebrates"</i>
2006	Master of Science in Marine Microbiology, International Max Planck Research School of Marine Microbiology, Bremen, Germany Grade A (excellent)
2004	Bachelor of Science in microbiology, University of Queensland, Brisbane, Australia Grade point average 6.22 out of a possible 7.0 (6.0 = distinction)

Awards and Fellowships

2018	ERC Starting Grant
2015	Fellowship of the Robert Bosch Foundation's 'Fast Track' program for excellent women in science
2013	ASLO Raymond L. Lindeman Award for an outstanding paper written by a young aquatic scientist
2011	Wolf Vishniac Award for Young Investigators from the International Society for Environmental Biogeochemistry
2007	Interridge Outstanding Student Paper Award, Interridge Theoretical Institute: Biogeochemical Interaction at Deep-Sea Vents, Woods Hole Oceanographic Institution, USA
2007	Poster Prize, Gordon Research Conference Applied and Environmental Microbiology, Mount Holyoke, USA

Research grants

2018	ERC Starting Grant (€ 1.5 Million)
2017	Individual PhD fellowship for Sarah Zauner from the Austrian Academy of Sciences (€ 126,000)

- 2016 Individual postdoc funding for Nathalie Elisabeth from the Region Guadeloupe (€ 55,000)
- 2015 Bosch Foundation Fellowship (€ 15,000)
- 2014 Vienna Science and Technology Fund (WWTF) 'Vienna Research Group' funding for an independent position at the University of Vienna (€ 1.6 Million)
- 2012 Individual doctoral thesis funding for Lizbeth Sayavedra from the German Academic Exchange Service (DAAD) (€ 48,000)

Selected presentations

- (upcoming) Gordon Research Conference Applied and Environmental Microbiology
Invited speaker
- (upcoming) Gordon Research Conference Animal-Microbe Symbioses
Invited speaker
- 2018 MIMAS-II Symposium on Microbial Interactions in Marine Systems, Greifswald Germany
Invited speaker
- 2018 Gordon Research Conference Microbial C1 Metabolism, USA –
Invited speaker
- 2018 Dutch Microbiology Society (KNVM) Spring Meeting, Arnhem –
Invited speaker
- 2018 Department of Ecology and Evolution, University of Salzburg, Austria –
Invited speaker
- 2017 3rd Institute of Oceanography, Xiamen, China – **Invited speaker**
- 2017 International CRC Workshop 'Survival Artists', Marburg Germany –
Keynote speaker
- 2017 Society for Aquatic Microbial Ecology (SAME), Zagreb Croatia –
Keynote speaker
- 2017 6th International Symposium on Chemosynthesis-Based Ecosystems, Woods Hole USA – **Keynote speaker**
- 2016 Annual Conference of the German Association for General and Applied Microbiology, Würzburg Germany – **Invited speaker**
- 2016 Annual Meeting of the Society for Integrative and Comparative Biology (SICB), New Orleans USA – **Invited speaker**
- 2016 ISME Meeting, Montreal Canada – **Session coordinator and speaker**
- 2016 ASM Microbe, Boston USA – **Invited speaker**
- 2016 Invited seminar at the Department of Microbiology, Radboud University, Nijmegen The Netherlands
- 2015 EMBO Workshop on Microbial Sulfur Metabolism, Helsingor Denmark – **Invited speaker**
- 2015 International Symbiosis Society Meeting, Lisbon Portugal – **Invited speaker**
- 2014 Vienna Biocenter PhD Symposium, Austria – **Invited speaker**
- 2014 Lyell Meeting of the Geological Society of London, England – **Invited speaker**
- 2013 Aquatic Sciences Meeting of the Association for the Sciences of Limnology and Oceanography, New Orleans USA – **Acceptance speech for the Lindeman award during plenary session**
- 2012 Canadian Institute for Advanced Research, Integrated Microbial Diversity program annual meeting, Quebec City Canada – **Invited speaker**
- 2011 20th International Society for Environmental Biogeochemistry Meeting, Istanbul Turkey – **Invited speaker**
- 2009 American Society for Microbiology (ASM) General Meeting, Philadelphia USA – **Invited speaker**

- 2008 European Geosciences Union (EGU) General Assembly, Vienna Austria – **Oral presentation**
- 2007 Annual Conference of the German Association for General and Applied Microbiology, Osnabrück Germany – **Oral presentation**

Supervision

I currently supervise one postdoc, three PhD students, and two Masters students

Past: Supervisor of three PhD theses, four Masters theses, co-supervisor of two Bachelors theses, planning and supervision of at least 10 short internships

Teaching and outreach

- 2015 – current: teaching in seminars, lectures and practical courses at the Bachelors (German) and Masters (English) level, University of Vienna
- January 2012 – August 2015, faculty member of the International Max Planck Research School for Marine Microbiology (MarMic)
 - 2013 and 2014, Lecturer for the Module ‘Symbiosis’ in the MarMic school
- Featured in newspaper articles in Der Standard, Die Presse, Austrian national news
- Featured on the German TV show ‘Buten un Binnen’ (August 2011)
- Invited lectures for courses on marine microbiology, hydrothermal vent biology
- Invited lecture on deep-sea research for members of the Bremen Chamber of Commerce (Bremen, 2012)
- Invited lecture for science delegates of the European Union (Bremen, 2007)

Professional services

- Member of the Expert Research Vessel Panel (GPF) of the German Research Foundation
- Co-chair of the working group ‘Symbiotic Interactions’ of the German Society for General and Applied Microbiology
- Chair, International Workshop on Microbial Sulfur Metabolism (WMSM), Vienna 2018
- Organizer of Satellite Meeting “Chemotrophic symbiosis in the genomic era” for the 8th International Symbiosis Society Meeting, Summer 2015
- Editor, mSystems, an American Society for Microbiology Journal
- Editor, Biological Bulletin
- Peer-review for Science, Current Biology, The ISME Journal, Molecular Ecology, Environmental Microbiology, PLoS One, Current Microbiology, Genome Biology and Evolution, The Biological Bulletin, Symbiosis, Biogeosciences Discussions, and others
- Proposal reviews for the Schmidt Ocean Institute, French National Research Council (ANR), National Science Foundation (NSF), German Research Foundation (DFG)
- Review panel member, Schmidt Ocean Institute
- Member of the judging committee for the MARUM Research Award for Marine Sciences
- Member of the MPI Bremen Employees Council from 2006 – 2010

Peer-reviewed publications

Author on 18 papers in peer-reviewed journals (including 1 first-author paper in Nature, 1 first-author paper in Nature Microbiology, 1 last- and corresponding authorship in eLife). Published papers have received 601 citations; H-index 14 (Google Scholar).

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§Equal contribution

18. Petersen J*, Osvatic J (2018). Microbiomes *in natura*: Importance of invertebrates in understanding the natural variety of animal-microbe interactions. ***mSystems*** 3.2: e00179-17

17. Petersen J*, Kemper A, Gruber-Vodicka H, Cardini U, van der Geest M, Musmann M, Bulgheresi S, Seah BKB, Chakkiath PA, Herbold C, Liu D, Belitz A, Weber M (2016). Chemosynthetic symbionts of marine invertebrate animals are capable of nitrogen fixation. ***Nature Microbiology*** 2: 16195 doi:10.1038/nmicrobiol.2016.195

16. Ponnudurai, RP, Kleiner M, Sayavedra L, Petersen JM, Moche M, Otto A, Becher D, Takeuchi T, Satoh N, Dubilier N, Schweder T, Markert S (2016). Metabolic and physiological interdependencies in the *Bathymodiolus azoricus* symbiosis. ***The ISME Journal*** 11: 463-477 doi:10.1038/ismej.2016.124

15. Assie A, Borowski C, van der Heijden K, Raggi L, Geier B, Leisch N, Schimak MP, Dubilier N, Petersen J* (2016) A specific and widespread association between deep-sea *Bathymodiolus* mussels and a novel family of Epsilonproteobacteria. ***Environmental Microbiology Reports*** 8: 805-813 doi: 10.1111/1758-2229.12442

14. Breusing C, Biastoch A, Drews A, Metaxas A, Jollivet D, Vrijenhoek RC, Bayer T, Melzner F, Sayavedra L, Petersen JM, Dubilier N, Schilhabel MB, Rosenstiel P, Reusch TBH (2016). Biophysical and population genetic models predict presence of "phantom" stepping stones connecting Mid-Atlantic Ridge vent ecosystems. ***Current Biology*** 26: 1 – 11.

13. Sayavedra L, Kleiner M, Ponnudurai R, Wetzel S, Pelletier E, Barbe V, Shoguchi E, Satoh N, Reusch TBH, Rosenstiel P, Schilhabel MB, Becher D, Schweder T, Markert S, Dubilier N, Petersen JM* (2015) An abundance of toxin-related genes in the genome of beneficial symbionts from deep-sea hydrothermal vent mussels. ***eLife*** e07966



12. Zimmermann J, Lott C, Weber M, Ramette A, Bright M, Dubilier N, Petersen JM* (2014) Dual symbiosis with co-occurring sulfur-oxidizing symbionts in vestimentiferan tubeworms from a Mediterranean hydrothermal vent. ***Environmental Microbiology*** 16: 3638-3656 doi: 10.1111/1462-2920.12427

This paper was featured on the cover of the December 2014 issue of Environmental Microbiology

11. Jan C, Petersen JM[§], Werner J[§], Teeling H[§], Huang S, Glöckner FO, Golyshina OV, Dubilier N, Golyshin PN, Jebbar M and Cambon-Bonavita M-A (2014) The gill chamber epibiosis of deep-sea shrimp *Rimicaris exoculata*: an in-depth metagenomic investigation and discovery of Zetaproteobacteria. ***Environmental Microbiology*** 16: 2723-2738 doi: 10.1111/1462-2920.1240

10. Raggi L, Schubotz F, Hinrichs K-U, Dubilier N, Petersen JM* (2013) Bacterial symbionts of *Bathymodiolus* mussels and *Escarpia* tubeworms from Chapopote, an asphalt seep in the southern Gulf of Mexico. ***Environmental Microbiology*** 15: 1969–1987 doi: 10.1111/1462-2920.12051

9. Kleiner M, Petersen JM, Dubilier N (2012) Convergent and divergent evolution of metabolism in sulfur-oxidizing symbionts and the role of horizontal gene transfer. ***Current Opinion in Microbiology*** 15:621–631 doi: 10.1016/j.mib.2012.09.003

8. Petersen JM*, Wentrup C, Verna C, Knittel K, Dubilier N (2012) Origins and evolutionary flexibility of chemosynthetic symbionts from deep-sea animals. ***The Biological Bulletin***. 223: 123–137.

7. van der Heijden K, **Petersen JM**, Dubilier N, Borowski C (2012) Gene flow across the equatorial belt on the Mid-Atlantic Ridge in chemosynthetic bivalves and their symbionts. *PLoS One* 7(7): e39994. doi:10.1371/journal.pone.0039994.

6. **Petersen JM**[§], Zielinski FU[§], Pape T, Seifert R, Moraru C, Amann R, Hourdez S, Girguis PR, Wankel SD, Barbe V, Pelletier E, Fink D, Borowski C, Bach W, and Dubilier N (2011) Hydrogen is an energy source for hydrothermal vent symbioses. *Nature* 476: 176–180 doi:10.1038/nature10325



This paper was featured on the cover of the August 11th issue of Nature and reported in numerous German and international newspapers such as Die Zeit, Frankfurter Allgemeine Zeitung, SpiegelOnline, msnbc, and in German national and regional television in the ZDF Heute Journal and the RadioBremen Buten un Binnen

5. Hügler M, **Petersen JM**, Dubilier N, Imhoff JF, Sievert SM (2011) Pathways of carbon and energy metabolism of the epibiotic community associated with the vent shrimp *Rimicaris exoculata*. *PLoS One* 6, doi:e1601810.1371/journal.pone.0016018.

4. **Petersen JM**, Ramette A, Lott C, Cambon-Bonavita MA, Zbinden M, and Dubilier N (2010) Biogeography of filamentous gamma- and epsilonproteobacterial epibionts on the shrimp *Rimicaris exoculata* from four Mid-Atlantic Ridge hydrothermal vent fields. *Environmental Microbiology* 12: 2204–2218 doi: 10.1111/j.1462-2920.2009.02129.x

3. **Petersen JM** and Dubilier N (2010) Symbiotic methane oxidizers. In: **Microbiology of Hydrocarbons, Oils, Lipids and Derived Compounds**. Ed. Kenneth N. Timmis. Springer.

2. Perner M, **Petersen JM**, Zielinski FU, Gennerich H-H, Seifert R (2010) Geochemical constraints on the diversity and activity of H₂-oxidizing bacteria and archaea in diffuse hydrothermal fluids from a basalt- and an ultramafic-hosted vent. *FEMS Microbiology Ecology* 74: 55-71 doi: 10.1111/j.1574-6941.2010.00940.x

1. **Petersen JM** and Dubilier N (2009) Methanotrophic symbioses in marine invertebrates. *Environmental Microbiology Reports* 1: 319–335 doi: 10.1111/j.1758-2229.2009.00081.x

Additional publications

4. **Petersen JM*** (2016) Dark energy on your dinner plate. *Current Biology* 26: R1277-R1279.

3. Cordes EE, Michel APM, **Petersen JM**, Wankel SD, Ansorge R, Girguis PR, Leisch N, Smart C, Roman C, Wetzel S, Vidoudez C (2016) ROV Hercules investigates brine lakes on the bottom of the ocean. *Oceanography* 29: 30 – 31.

2. **Petersen JM***, Dubilier N (2014) Gene swapping in the dead zone. *eLife* 3: e04600.

1. Fisher CR, Baums IB, Demopoulos AWJ, Dubilier N, Girard F, Kovacs K, Kurman M, Mentch J, **Petersen JM**, Saunders M, Sayavedra L, Sibert RJ, Vohsen S (2015) Ecosystem Impacts of Oil and Gas Inputs to the Gulf of Mexico (ECOGIG). ***Oceanography*** 28: 28 – 29.

Manuscripts submitted and in preparation

8. Sayavedra L, Ansorge R, Dubilier N, **Petersen JM***. Horizontal acquisition followed by expansion and diversification of toxin-related genes in deep-sea bivalve symbionts.

7. Huang Z, **Petersen JM**, Shao Zongze. Genomic traits of an abalone endosymbiont that represents a novel order-level lineage, *Pararickettsiales* in the *Alphaproteobacteria*. *Intended as an article in Environmental Microbiology*

6. Assié A, Leisch N, Gruber-Vodicka H, Joye SB, Saxton M, Tegetmeyer H, Dubilier N, **Petersen JM***. Horizontal acquisition of the Calvin cycle and genes for sulfur oxidation by epsilonproteobacterial epibionts of marine mussels. *Intended as an article in a high-ranking journal e.g. PNAS*

5. Assié A, Huber J, Reveillaud J, van Dover CL, Geier B, Borowski C, Dubilier N, **Petersen JM***. Biogeographic structuring of the epibiotic community on deep-sea *Rimicaris hybisae* shrimp. *Intended as an article in Frontiers in Microbiology*

4. Sayavedra L, Ansorge R, Liebeke M, Dubilier N, **Petersen JM***. Understanding symbiont colonization in deep-sea mussels using differential gene expression. *Intended as an article in the ISME Journal*

3. Sayavedra L, **Petersen JM**, González-Porrás MÁ, Chakkiath PA, Liebeke M, Michellod D, Barrero-Canosa J, Dubilier N. Symbiont strain heterogeneity confers metabolic flexibility in deep-sea mussels: Methylophony in sulfur-oxidizing symbionts. *Intended as an article in a high-ranking journal e.g. Nature Microbiology*

2. Zimmermann J, Ott J, Musat N, Gruber-Vodicka H, Dubilier N **Petersen JM*** Highly specific ectosymbionts of co-occurring closely related nematodes from the North Sea. *Intended as an article in the ISME Journal*

1. **Petersen JM**, Raggi L, Fink D, Dubilier N Intranuclear bacteria are widespread in shallow-water bivalves. *Intended as an article in Environmental Microbiology*