

# Univ.-Prof. Dr. Matthias Horn

Deputy Head of the Division of Microbial Ecology  
Deputy Head of the Research Network “Chemistry meets Microbiology”

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## Research interests

- Microbial symbioses, with emphasis on bacterial symbionts of protists and insects
- Evolution of intracellular bacteria
- Microbial genome evolution
- Molecular and cellular biology of intracellular bacteria
- Bacteria-host interactions

## Professional experience

since 1/2015	Deputy Head of the Research Network “Chemistry meets Microbiology” Deputy Head of the Division of Microbial Ecology
since 9/2007	Full Professor, University of Vienna
9/2007 - 3/2013	Deputy Head of the Department of Microbial Ecology
2/2006	Associate Professor for Microbial Symbioses (“Vertragsprofessor”) at the Department of Microbial Ecology, University of Vienna
6/2005	“Habilitation” (venia docendi) in Microbiology (thesis “Symbiotic interactions between pro- and eukaryotes”) obtained at the University of Vienna
2/2003 - 1/2006	Assistant Professor (“Universitätsassistent”) at the Department of Microbial Ecology, University of Vienna, Austria
9/2001 - 1/2003	Postdoctoral researcher at the Department of Microbiology, Technische Universität München, Germany
8/1998 - 11/1998	Research stay at the Department of Clinical Microbiology, University of Washington, Seattle, WA, USA

## Education

14.08.2001	Dissertation (Dr. rer. nat.), grade achieved: “summa cum laude” (with distinction)
27.05.1998	Diploma in Biology degree (Dipl. Biol. Univ.)

## Honors and awards

2011	ERC Starting Grant (Consolidator Track)
2009-2017	Member of the Young Academy of the Austrian Academy of Sciences (ÖAW)
2005	START Award of the Austrian Science Fund (FWF)
2001	Federation of European Microbiological Societies (FEMS) Young Scientist Grant
1998	Scholarship from the Deutsche Gesellschaft für Hygiene und Mikrobiologie e.V. (DGHM)

### Fund raising summary

Since 2003, raised **13 third party funded projects** from Austria, the US, and the EU as PI or Co-PI, including an FWF START Award in 2005, and an ERC Starting Grant (Consolidator Track) in 2011. In total, our research was supported by **more than 5 M€**.

### Publication summary

Since 1999, **103 papers** in peer-reviewed journals and 4 book chapters, including 2 papers in *Nature*, 3 in *Science*, 2 in *Nature Communications* and PNAS respectively, and 1 in *PLoS Biology*. Papers have received **7,982 citations**, which corresponds to **H-index 45** (Web of Science).

A complete list of publications and citation data is available at:

<http://www.microbial-ecology.net/horn> and <http://www.researcherid.com/rid/G-1136-2011>

### Teaching activities and supervision of graduate students

Over **70 courses** in bachelor and master programs at the University of Vienna since 2003.

Lectures: Biodiversity of microorganisms, Microbial communities and symbioses, Microbial symbiosis – concepts and model systems, Bacterial physiology

Seminars: Current topics in molecular microbial ecology and evolution, Current topics in symbiosis research, Molecular processes of early evolution, Field trips in microbiology

Lab courses: Culture-independent identification of microbes, Molecular phylogeny and evolution

Served as main supervisor for **17 diploma/master's students** and **10 PhD students**, 4 additional PhD students have not yet completed their studies.

### Awards and fellowships of lab members

- Cecilia Wentrup: Back to Research Grant University of Vienna 2018
- Tamara Halter: uni:docs Fellowship 2018-2021
- Vincent Delafont: Marie Skłodowska-Curie Individual Fellowship 2016-2017
- Cecilia Wentrup: Marie Skłodowska-Curie Individual Fellowship 2015-2017
- Barbara S. Sixt: Marie Skłodowska-Curie Individual Global Fellowship 2014-2016
- Elena Toenshoff: Austrian Science Fund (FWF) Erwin Schrödinger Fellowship 2014-16
- Frederik Schulz: Austrian Academy of Sciences (ÖAW) Doc-FORTE stipend 2013-2015
- Karin Aistleitner: Winner of Pecha Kucha Contest „Biology on Stage - 400 Seconds of Life” at the University of Vienna, 2012
- Barbara S. Sixt: San-Pin Wang Award at the CRBS Meeting 2011 (best oral presentation by a PhD student)
- Karin Aistleitner: Jane E. Raulston Award at the CRBS Meeting 2011 (best poster presentation by a PhD student)
- Barbara S. Sixt: Austrian Academy of Sciences (ÖAW) Doc-FORTE stipend, 2009-2012

### Positions of former PhD students and postdocs members

#### At academic institutions

- Stephan Schmitz-Esser: Iowa State University, Ames, IA, USA
- Astrid Collingro: University of Vienna, Vienna, Austria
- Eva Heinz: Wellcome Trust Sanger Institute, Cambridge, UK
- Elena Tönshoff: University of Basel, Basel, Switzerland
- Jacqueline Montanaro: Medical University of Vienna, Vienna, Austria

- Thomas Penz: CeMM Research Center for Molecular Medicine, Vienna, Austria
- Barbara Sixt: Duke University Durham, NC, USA
- Karin Aistleitner: U.S. Department of Health and Human, National Institute of Allergy and Infectious Diseases (NIAID)
- Illias Lagkouvardos: Technische Universität München, Munich, Germany
- Daryl Domman: Wellcome Trust Sanger Institute, Cambridge, UK
- Frederik Schulz: DOE Joint Genome Institute, Walnut Creek, CA, USA
- Vincent Delafont: Assistant Professor, University of Poitiers, France

*At biotech companies*

- Alexander Siegl: vermicon AG, Munich Germany
- Lisa Schuster: Heinekamp Labor- u. Institutsplanung GmbH, Karlsfeld, Germany

**Editorial activities**

- since 2017 Editorial Board Member of *Environmental Microbiology*  
since 2015 Editorial Board Member of *Scientific Reports*  
since 2012 Editorial board member of *Pathogens and Disease*  
2012-2017 Academic Editor of *PLoS One*  
2010-2016 Associate Editor of *Frontiers in Evolutionary and Genomic Microbiology*  
2010-2014 Editorial board member *Journal of Eukaryotic Microbiology*

**Reviewer activities for journals and funding agencies**

Referee for diverse journals including *Nature*, *Proc. Natl. Acad. Sci. U. S. A.*, *Trends in Microbiology*, *PLoS Genetics*, *Genome Research*, *Molecular Microbiology*, *Journal of Bacteriology*, *Nucleic Acids Research*, *The ISME Journal*, *Nature Communications*, *Nature Microbiology*, and others.

Reviewer of grant applications for diverse funding agencies including DFG (Germany), SNF (Switzerland), HFSP Human Frontier Science Program, NSERC (Canada), NERC UK

**Invited lectures and invited conference presentations**

**More than 40 invited lectures** and invited conference presentations at national and international meetings including the 1<sup>st</sup> Gordon Research Conference on Animal Microbe Symbioses, a State-of-the-Art Lecture at the 5<sup>th</sup> Meeting of the European Society for Chlamydia Research, a plenary lecture at the Annual Conference of the German Association for General and Applied Microbiology (VAAM), and invited talks at the 9<sup>th</sup> Symposium of the International Society of Endocytobiology, the 5<sup>th</sup> Congress of the International Symbiosis Society (ISS), the XII. International Congress of Bacteriology and Applied Microbiology, the 3<sup>rd</sup> and 5<sup>th</sup> FEMS Congress of European Microbiologists, the ASM General Meetings 2014 and 2016.

Served as session chair at several international conferences including the 11<sup>th</sup> and 15<sup>th</sup> Symposium of the International Society for Microbial Ecology (ISME), the 5<sup>th</sup> Congress of the International Symbiosis Society (ISS), the 3<sup>rd</sup> FEMS Congress of European Microbiologists, the 2009 and 2011 Meetings of the Chlamydia Basic Research Society, and the 15<sup>th</sup> International Meeting on the Biology and Pathogenicity of Free-Living Amoebae.

**Organization of international conferences**

- 2017-19 Councillor of the Chlamydia Basic Research Society for the 9<sup>th</sup> Biennial Meeting 2019, Seattle WA, USA  
2015 Member of the organising committee for the 13. German Chlamydia Workshop, Vienna, Austria

- 2013 Member of the organising committee for the Free Living Amoeba Meeting 2013, Vienna, Austria
- 2010/11 Member of the program committee of the Chlamydia Basic Research Society, 2011 Biennial Meeting, Redondo Beach CA, USA
- 2006 Member of the local organising committee for the International Symposium on Microbial Ecology (ISME-11) 2006, Vienna, Austria
- 2006 Member of the organising committee for the Fifth International Symbiosis Society (ISS) Congress 2006, Vienna, Austria
- 2004 - 2010 Member of the organising committee for the annual German Chlamydia Workshop, Berlin/Jena/Düsseldorf/Hannover/Ulm/Lübeck/Munich, Germany
- 2001, 2002, 2004 Co-organiser and lecturer at the “Corso Di Identificazione Di Microrganismi Tramite Ibridazione Fluorescente In Situ (FISH)”, Centro Nazionale Ricerche Istituto Ricerca Sulle Acque (CNR IRSA), Perugia, Italy
- since 2001 Co-organiser, lecturer and supervisor at the annual “International FISH Course”, Technische Universität München, Germany, and University of Vienna, Austria
- 3/2001 Co-organiser and lecturer at the international workshop “Molecular microbial ecology: the rRNA approach and beyond”, Genoscope, Evry, France

#### **Other professional activities / services to the scientific community**

- since 2013 Member of the Scientific Advisory Board for Genetic Engineering (“Gentechnikkommission”) of the Austrian Federal Minister for Health
- since 2009 Advisory Board member of the section “Symbiotic Interactions” of the German Association for General and Applied Microbiology (VAAM)
- 2008-2012 National representative of the COST Action FA0701 “Arthropod Symbioses”
- since 2008 Developer and webmaster of the online tool probeCheck ([www.microbial-ecology.net/probecheck](http://www.microbial-ecology.net/probecheck)); 3,200 page views per month in 2016
- since 2001 Developer and webmaster of the public online-database probeBase ([www.probebase.net](http://www.probebase.net)); 17,000 page views per month in 2016

#### **Public outreach**

**Over 30 newspaper and magazine articles**, among others in the German national news magazines *Der Spiegel* and *Die Zeit*, and the Austrian national newspapers *Der Standard* and *Die Presse*. Appeared on several radio features and served as interview partner in the main news show (ZIB2) on national TV (ORF) in Austria. Contributed several lectures to the **Kinderuni** ([www.kinderuni.at](http://www.kinderuni.at)), an annual summer school for children between age 7 and 12.

*Last updated: 22.12.2018*

## List of publications

A total of **103 papers** since 1999 in peer-reviewed journals, including 2 papers in *Nature*, 3 in *Science*, 2 in *Nature Communications* and *PNAS* respectively, and 1 in *PLoS Biology* received **7,982 citations**, corresponding to **H-index 45** (Web of Science, accessed Dec 22, 2018).

A complete list of publications and citation data is available at:

<http://www.microbial-ecology.net/publications?author=264&year%5Bvalue%5D%5Byear%5D>,

<http://www.researcherid.com/rid/G-1136-2011>, <https://orcid.org/0000-0002-8309-5855>

1. Michalik A, Schulz F, Michalik K, Wascher F, Horn M, Szklarzewicz T. 2018. Coexistence of novel gammaproteobacterial and Arsenophonus symbionts in the scale insect Greenisca brachypodii (Hemiptera, Coccothraupidae: Eriococcidae). **Environ Microbiol** 20: 1148-1157.
2. Böck D, Medeiros JM, Tsao HF, Penz T, Weiss GL, Aistleitner K, Horn M, Pilhofer M. 2017. In situ architecture, function, and evolution of a contractile injection system. **Science** 357: 713-717.
3. Collingro A, Koestlbacher S, Musmann M, Stepanauskas R, Hallam SJ, Horn M. 2017. Unexpected genomic features in widespread intracellular bacteria: evidence for motility of marine chlamydiae. **ISME J** 11: 2334-2344.
4. Tsao HF, Scheikl U, Volland JM, Koehsler M, Bright M, Walochnik J, Horn M. 2017. 'Candidatus Cochliophilus cryoturris' (Coxiellaceae), a symbiont of the testate amoeba Cochliopodium minus. **Sci Rep** 1: 3394.
5. Koenig L, Siegl A, Penz T, Haider S, Wentrup C, Polzin J, Mann E, Schmitz-Esser S, Domman D, Horn M. 2017. Biphasic metabolism and host interaction of a chlamydial symbiont. **msystems** 2: e00202-16.
6. Schulz F, Yutin N, Ivanova NN, Ortega DR, Lee TK, Vierheilig J, Daims H, Wagner M, Horn M, Jensen GJ, Kyrpides NC, Koonin EV, Woyke T. 2017. Giant viruses with an expanded complement of translation system components. **Science** 6333: 82-85.
7. Szabó G, Schulz F, Toenshoff ER, Volland JM, Finkel OM, Belkin S, Horn M. 2017. Convergent patterns in the evolution of mealybug symbioses involving different intrabacterial symbionts. **ISME J** 3: 715-726.
8. Zojer M, Schuster LN, Schulz F, Pfundner A, Horn M, Rattei T. 2017. Variant profiling of evolving prokaryotic populations. **PeerJ** e2997.
9. Manzano-Marín A, Szabó G, Simon JC, Horn M, Latorre A. 2017. Happens in the best of subfamilies: establishment and repeated replacements of co-obligate secondary endosymbionts within Lachninae aphids. **Environ Microbiol** 19: 393-408.
10. Lagkouvardos I, Joseph D, Kapfhammer M, Giritli S, Horn M, Haller D, Clavel T. 2016. IMNGS: A comprehensive open resource of processed 16S rRNA microbial profiles for ecology and diversity studies. **Sci Rep** 33721.
11. Scheikl U, Tsao HF, Horn M, Indra A, Walochnik J. 2016. Free-living amoebae and their associated bacteria in Austrian cooling towers: a 1-year routine screening. **Parasitol Res** 115: 3365.
12. Schulz F, Martijn J, Wascher F, Lagkouvardos I, Kostanjšek R, Ettema TJ, Horn M. 2016. A *Rickettsiales* symbiont of amoebae with ancient features. **Environ Microbiol** 8: 2326-42.
13. Klose J, Aistleitner K, Horn M, Krenn L, Dirsch V, Zehl M, Bright M. 2016. Trophosome of the deep-sea tubeworm Riftia pachyptila inhibits bacterial growth. **PLoS One** 11: e0146446
14. Greuter D, Loy A, Horn M, Rattei T. 2016 probeBase - an online resource for rRNA-targeted oligonucleotide probes and primers: new features 2016. **Nucleic Acids Res** 44: D586-D589

15. Pizzetti I, Schulz F, Tysl T, Fuchs BM, Amann R, Horn M, Fazi S. 2016 Chlamydial seasonal dynamics and isolation of 'Candidatus Neptunochlamydia vexilliferae' from a Tyrrhenian coastal lake. **Environ Microbiol** 8: 2405-17.
16. Sachse K, Bavoil PM, Kaltenboeck B, Stephens RS, Kuo CC, Rosselló-Móra R, Horn M. 2015. Emendation of the family *Chlamydiaceae*: Proposal of a single genus, *Chlamydia*, to include all currently recognized species. **Syst Appl Microbiol** 38: 99-103
17. Schulz F, Horn M. 2015. Intranuclear bacteria: inside the cellular control center of eukaryotes. **Trends Cell Biol** 6: 339-346.
18. Domman D, Horn M, Embley TM, Williams TA. 2015. Plastid establishment did not require a chlamydial partner. **Nature Comm** 6: 6421.
19. Schulz F, Tysl T, Pizzetti I, Dyková I, Fazi S, Kostka M, Horn M. 2015. Marine amoebae with cytoplasmic and perinuclear symbionts deeply branching in the *Gammaproteobacteria*. **Sci Rep** 5: 13381.
20. Collingro A, Kostanjšek R, Toenshoff ER, Schulz F, Schuster L, Domann D, Horn M. 2015. Draft genome sequence of "Candidatus Hepatoplasma crinochetorum" Ps, a bacterial symbiont in the hepatopancreas of the terrestrial isopod *Porcellio scaber*. **Genome Announc** 3: e00674-15.
21. Feldbauer R, Schulz F, Horn M, Rattei T. 2015. Prediction of microbial phenotypes based on comparative genomics. **BMC Bioinformatics** 16: S1
22. Martijn J, Schulz F, Zaremba-Niedzwiedzka K, Viklund J, Stepanauskas R, Andersson SG, Horn M, Guy L, Ettema TJ. 2015. Single-cell genomics of a rare environmental alphaproteobacterium provides unique insights into *Rickettsiaceae* evolution. **ISME J** 9: 2373-85
23. Domman D, Horn M. 2015- Following the footsteps of chlamydial gene regulation. **Mol Biol Evol** 32: 3035-46.
24. Lagkourdos I, Jehl MA, Rattei T, Horn M. 2014. The signature protein of the PVC superphylum. **Appl Environ Microbiol** 80: 440-445.
25. Lagkourdos I, Weinmaier T, Lauro F, Cavicchioli R, Rattei T, Horn M. 2014. Integrating metagenomic and amplicon databases to resolve the phylogenetic and ecological diversity of the Chlamydiae. **ISME J** 8: 115-125.
26. Pilhofer M, Aistleitner K, Ladinsky MS, König L, Horn M, Jensen GJ. 2014. Architecture and host interface of environmental chlamydiae revealed by electron cryotomography. **Environ. Microbiol** 16: 417-429.
27. Subtil A, Collingro A, Horn M. 2014. Tracing the primordial Chlamydiae: extinct parasites of plants? **Trends Plant Sci** 19: 36-43.
28. Toenshoff ER, Szabó G, Gruber D, Horn M. 2014. The pine bark adelgid *Pineus strobi* contains two novel bacteriocyte-associated gammaproteobacterial symbionts. **Appl Environ Microbiol** 80: 878-885.
29. Omsland A, Sixt BS, Horn M, Hackstadt T. 2014. Chlamydial metabolism revisited: interspecies metabolic variability and developmental stage-specific physiologic activities. **FEMS Microbiol Rev** 38: 779-801.
30. Schulz F, Lagkourdos I, Wascher F, Aistleitner K, Kostanjšek R, Horn M. 2014. Life in an unusual intracellular niche: a bacterial symbiont infecting the nucleus of amoebae. **ISME J** 8: 1634-1644.
31. Lagkourdos I, Shen J, Horn M. 2014. Improved axenization method reveals complexity of symbiotic associations between bacteria and acanthamoebae. **Environ Microbiol Rep** 6: 383-388.

32. Aistleitner K, Anrather D, Schott T, Klose J, Bright M, Ammerer G, Horn M. 2014. Conserved features and major differences in the outer membrane protein composition of chlamydiae. **Environ Microbiol** 17: 1397-1413.
33. Domman D, Collingro A, Lagkouravdos I, Gehre L, Weinmaier T, Rattei T, Subtil A, Horn M. 2014. Massive expansion of ubiquitination-related gene families within the Chlamydiae. **Mol Biol Evol** 31: 2890-2904.
34. Aistleitner K, Heinz C, Hörmann A, Heinz E, Montanaro J, Schulz F, Maier E, Pichler P, Benz R, Horn M. 2013. Identification and characterization of a novel porin family highlights a major difference in the outer membrane of chlamydial symbionts and pathogens. **PLoS One** e55010.
35. Klindworth A, Pruesse E, Peplies J, Quast C, Horn M, Glöckner FO. 2013. Evaluation of general 16S ribosomal RNA gene PCR primers for classical and next generation sequencing based diversity studies. **Nucleic Acids Res** 41: e1.
36. Penz T., Schmitz-Esser S., Kelly SE, Cass BN, Mueller A, Woyke T, Malfatti SE, Hunter MS, Horn M. 2012. Comparative genomics suggests an independent origin of cytoplasmic incompatibility in *Cardinium hertigii*. **PLoS Genetics** 8: e1003012.
37. Clarke M, Lohan AJ, Liu B, Lagkouravdos L, Roy S, Zafar N, Bertelli C, Schilde C, Kianianmomeni A, Bürglin TR, Frech C, Turcotte B, Kopec KO, Synnott JM, Choo C, Paponov I, Finkler A, Tan CSH, Hutchins AP, Weinmeier T, Rattei T, Chu JSC, Gimenez G, Irimia M, Rigden DJ, Fitzpatrick DA, Lorenzo-Morales J, Bateman A, Chiu CH, Tang P, Hegemann P, Fromm H, Raoult D, Greub G, Miranda-Saavedra D, Nansheng Chen, Nash P, Ginger ML, Horn M, Schaap P, Caler L, Loftus, BJ. 2013. Genome of *Acanthamoeba castellanii* highlights extensive lateral gene transfer and early evolution of tyrosine kinase signaling. **Genome Biol** 14: R11.
38. Haferkamp I, Penz T, Geier M, Ast M, Mushak T, Horn M, Schmitz-Esser S. 2013. The endosymbiont *Amoebophilus asiaticus* encodes an S-adenosylmethionine carrier compensating for its missing methylation cycle. **J Bacteriol** 195: 3183-3192.
39. Mitchell SO, Steinum TM, Toenshoff ER, Kvellestad A, Falk K, Horn M, Colquhoun DJ. 2013. 'Candidatus *Branchiomonas cysticola*' is a common agent of epitheliocysts in seawater farmed Atlantic salmon (*Salmo salar*) in Norway and Ireland. **Dis Aquat Organ** 103: 35-43.
40. Pilhofer M, Aistleitner K, Biboy J, Gray J, Kuru E, Hall E, Brun YV, VanNieuwenhze MS, Vollmer W, Horn M, Jensen GJ. 2013. Discovery of chlamydial peptidoglycan reveals bacteria with murein sacculi but without FtsZ. **Nature Comm** 4: 2856.
41. Sixt BS, Kostanjek R, Mustedanagic A, Toenshoff ER, Horn M. 2013. Developmental cycle and host interaction of *Rhabdochlamydia porcellionis*, an intracellular parasite of terrestrial isopods. **Environ Microbiol** 15: 2980-2993.
42. Sixt BS, Siegl A, Müller C, Watzka M, Wultsch A, Tziotis D, Montanaro J, Richter A, Schmitt-Kopplin P, Horn M. 2013. Metabolic features of *Protochlamydia amoebophila* elementary bodies - a link between activity and infectivity in Chlamydiae. **PLoS Pathogens** 9: e1003553.
43. Sixt BS, Hiess B, König L, Horn M. 2012. Lack of effective anti-apoptotic activities restricts growth of *Parachlamydiaceae* in insect cells. **PLoS One** e29565
44. Toenshoff ER, Gruber D, Horn M. 2012. Coevolution and symbiont replacement shaped the symbiosis between adelgids (Hemiptera: Adelgidae) and their bacterial symbionts. **Environ Microbiol** 14: 1284-1295.
45. Toenshoff ER, Kvellestad A, Mitchell SO, Steinum T, Falk K, Colquhoun DJ, Horn M. 2012. A novel betaproteobacterial agent of gill epitheliocystis in seawater farmed Atlantic salmon (*Salmo salar*). **PLoS One** 7: e32696.

46. Toenshoff ER, Penz T, Narzt T, Collingro A, Schmitz-Esser S, Pfeiffer S, Klepal W, Wagner M, Weinmaier T, Rattei T, Horn M. 2012. Bacteriocyte-associated gammaproteobacterial symbionts of the *Adelges nordmannianae/piceae* complex (Hemiptera: Adelgidae) **ISME J** 6: 384-396.
47. Knab S, Mushak TM, Schmitz-Esser S, Horn M, Haferkamp I. 2011. Nucleotide parasitism by *Simkania negevensis* (Chlamydiae). **J Bacteriol** 193: 225-235.
48. Sixt BS, Heinz C, Pichler P, Heinz E, Montanaro J, Op den Camp HJM, Ammerer G, Mechtler K, Wagner M, Horn M. 2011. Proteomic analysis reveals a virtually complete set of proteins for translation and energy generation in elementary bodies of the amoeba symbiont *Protochlamydia amoebophila*. **Proteomics** 11: 1868-1892.
49. Collingro A, Tischler P, Weinmaier T, Penz T, Heinz E, Brunham RC, Read TD, Bavoil PM, Sachse K, Kahane S, Friedman MG, Rattei T, Myers GSA, Horn M. 2011. Unity in variety - the pan-genome of the Chlamydiae. **Mol Biol Evol** 28: 3253-3270.
50. Gruber-Vodicka HR, Dirks U, Leisch N, Baranyi C, Stoecker K, Bulgheresi S, Heindl NR, Horn M, Lott C, Loy A, Wagner M, Ott J. 2011. Paracatenula, an ancient symbiosis between thiotrophic Alphaproteobacteria and catenulid flatworms. **Proc Natl Acad Sci USA** 108: 12078-12083.
51. Steger D, Berry D, Haider S, Horn M, Wagner M, Stocker R, Loy A. 2011. Systematic spatial bias in DNA microarray hybridization is caused by probe spot position-dependent variability in lateral diffusion. **PLOS One** 6: e23727.
52. Schmitz-Esser S, Penz T, Spang A, Horn M. 2011. A bacterial genome in transition - an exceptional enrichment of IS elements but lack of evidence for recent transposition in the symbiont *Amoebophilus asiaticus*. **BMC Evol Biol** 11: 270.
53. Schmitz-Esser S, Tischler P, Arnold R, Montanaro J, Wagner M, Rattei T, Horn M. 2010. The genome of the amoeba symbiont '*Candidatus Amoebophilus asiaticus*' reveals common mechanisms for host cell interaction among amoeba-associated bacteria. **J Bacteriol** 192: 1045-1057.
54. Berry D, Horn M, Xi C, Raskin L. 2010. *Mycobacterium avium* infections of *Acanthamoeba* strains: host strain variability, grazing-acquired infections, and altered dynamics of inactivation with monochloramine. **Appl Environ Microbiol** 76: 6685-6688.
55. Haider S, Wagner M, Schmid MC, Sixt BS, Christian JG, Häcker G, Pichler P, Mechtler K, Müller A, Baranyi C, Toenshoff ER, Montanaro J, Horn M. 2010. Raman microspectroscopy reveals long-term extracellular activity of chlamydiae. **Mol Microbiol** 77: 687-700.
56. Webster NS, Taylor MW, Behnam F, Lücker S, Rattei T, Whalan S, Horn M, Wagner M. 2010. Deep sequencing reveals exceptional diversity and modes of transmission for bacterial sponge symbionts. **Environ Microbiol** 12: 2070-2082.
57. Heinz E, Rockey DD, Montanaro J, Aistleitner K, Wagner M, Horn M. 2010. Inclusion membrane proteins of *Protochlamydia amoebophila* UWE25 reveal a conserved mechanism for host cell interaction among the Chlamydiae. **J Bacteriol** 192: 5093-5102.
58. Heinz E, Pichler P, Heinz C, op den Camp HJM, Toenshoff ER, Ammerer G, Mechtler K, Wagner M, Horn M. 2010. Proteomic analysis of the outer membrane of *Protochlamydia amoebophila* elementary bodies. **Proteomics** 10: 4363-4376.
59. Penz T, Horn M, Schmitz-Esser S. 2010. The genome of the amoeba symbiont "*Candidatus Amoebophilus asiaticus*" encodes an *afp*-like prophage possibly used for protein secretion. **Virulence**: 1-5.



60. Rinke C, Schmitz-Esser S, Loy A, Horn M, Wagner M, Bright M. 2009. High genetic similarity between two geographically distinct strains of the sulfur-oxidizing symbiont '*Candidatus Thiobios zoothamnicoli*' **FEMS Microbiol Ecol** 67: 229-41.
61. Arnold R, Brandmaier S, Kleine F, Tischler P, Heinz E, Behrens S, Niinikoski A, Mewes HW, Horn M, Rattei T. 2009. Sequence-based prediction of type III secreted proteins. **PLoS Pathogens** 5: e1000376.
62. Ast M, Gruber A, Schmitz-Esser S, Neuhaus HE, Kroth PG, Horn M, Haferkamp I. 2009. Diatom plastids depend on nucleotide import from the cytosol. **PNAS** 106: 3621-3626.
63. Heinz E, Tischler P, Rattei T, Myers G, Wagner M, Horn M. 2009. Comprehensive in silico prediction and analysis of chlamydial outer membrane proteins reflects evolution and life style of the Chlamydiae. **BMC Genomics** 10: 634.
64. Horn M. 2008. Chlamydiae as symbionts in eukaryotes. **Ann Rev Microbiol** 62: 113-131.
65. Loy A, Arnold R, Tischler P, Rattei T, Wagner M, Horn M. 2008. probeCheck - a central resource for evaluating oligonucleotide probe coverage and specificity. **Environ Microbiol** 10: 2894-2896.
66. Schmitz-Esser S, Haferkamp I, Knab S, Penz T, Ast M, Kohl C, Wagner M, Horn M. 2008. *Lawsonia intracellularis* encodes a functional rickettsia-like ATP/ADP translocase for host exploitation. **J Bacteriol** 190: 5746-5752.
67. Schmitz-Esser S, Toenshoff ER, Haider S, Heinz E, Hoenninger VM, Wagner M, Horn M. 2008. Diversity of bacterial endosymbionts of environmental *Acanthamoeba* isolates. **Appl Environ Microbiol** 74: 5822-5831.
68. Loy A, Maixner F, Wagner M, Horn M. 2007. probeBase - an online resource for rRNA-targeted oligonucleotide probes: new features 2007. **Nucleic Acids Res** 35: D800-D804.
69. Heinz E, Kolarov I, Kästner C, Toenshoff ER, Wagner M, Horn M. 2007. An *Acanthamoeba* sp. containing two phylogenetically different bacterial endosymbionts **Environ Microbiol** 9: 1604-1609.
70. Trentmann O, Horn M, van Scheltinga AC, Neuhaus HE, Haferkamp I. 2007. Enlightening energy parasitism by analysis of an ATP/ADP transporter from chlamydiae. **PLoS Biol** 9: e231.
71. Haider S, Collingro A, Walochnik J, Wagner M, Horn M. 2008. Chlamydia-like bacteria in respiratory samples of community-acquired pneumonia patients. **FEMS Microbiol Lett** 281: 198-202.
72. Strous M, Pelletier E, Mangenot S, Rattei T, Lehner A, Taylor MW, Horn M, Daims H, Bartol-Mave D, Wincker P, Barbe V, Fonknechten N, Vallenet D, Segurens B, Schenowitz-Truong C, Médigue C, Collingro A, Snel B, Dutilh BE, Op den Camp HJM, van der Drift C, Cirpus I, van de Pas-Schoonen KT, Harhangi HR, van Niftrik L, Schmid M, Keltjens J, van de Vossenberg J, Kartal B, Meier H, Frishman D, Huynen MA, Mewes HW, Weissenbach J, Jetten MSM, Wagner M, Le Paslier D (2006). Deciphering the evolution and metabolism of an anammox bacterium from a community genome. **Nature** 440: 790-794.
73. Haferkamp I, Schmitz-Esser S, Wagner M, Neigel N, Horn M, Neuhaus HE. 2006. Tapping the nucleotide pool of the host: novel nucleotide carrier proteins of *Protochlamydia amoebophila*. **Mol Microbiol** 60: 1534-1545.
74. Wagner M, Horn M. 2006. The *Planctomycetes*, *Verrucomicrobia*, *Chlamydiae* and sister phyla comprise a superphylum with biotechnological and medical relevance. **Curr Opin Biotechnol** 17: 241-249.

75. Collingro A, Poppert S, Heinz E, Schmitz-Esser S, Essig A, Schweikert M, Wagner M, Horn M. 2005. Recovery of an environmental chlamydia strain from activated sludge by co-cultivation with *Acanthamoeba* sp. **Microbiology** 151: 301-309.
76. Collingro A, Toenshoff ER, Taylor MW, Fritsche TR, Wagner M, Horn M. 2005. '*Candidatus* Protochlamydia amoebophila', an endosymbiont of *Acanthamoeba* spp. **Int J Syst Evol Microbiol** 55: 1863-1866.
77. Everett KDE, Thao M, Horn M, Dyszynski GLE, Baumann P. 2005. Novel chlamydiae in whiteflies and scale insects: endosymbionts '*Candidatus* Fritschea bemisiae' strain Falk and '*Candidatus* Fritschea eriococci' strain Elm. **Int J Syst Evol Microbiol** 55: 1581-1587.
78. Molmeret M, Horn M, Wagner M, Santic M, Abu Kwaik Y. 2005. Amoeba as training grounds for intracellular bacterial pathogens. **Appl Environ Microbiol** 71: 20-28.
79. Rinke C, Schmitz-Esser S, Stoecker K, Nussbaumer AD, Molnár DA, Vanura K, Wagner M, Horn M, Ott J, Bright M. 2006. '*Candidatus* Thiobios zoothamnocoli', an ectosymbiotic bacterium covering the giant marine ciliate *Zoothamnium niveum*. **Appl Environ Microbiol** 72: 2014-2021.
80. Fieseler L, Horn M, Wagner M, Hentschel U. 2004. Discovery of the novel candidate phylum "Poribacteria" in marine sponges. **Appl Environ Microbiol** 70: 3724-3732.
81. Fokin SI, Przybos E, Chivilev SM, Beier CL, Horn M, Skotarczak B, Wodecka B, Fujishima M. 2004. Morphological and molecular investigations of *Paramecium schewiakoffi* sp. nov. (Ciliophora, Oligohymenophorea) and current status of distribution and taxonomy of *Paramecium* spp. **Europ J Protist** 40: 225-243.
82. Schmitz-Esser S, Linka N, Collingro A, Beier CL, Neuhaus HE, Wagner M, Horn M. 2004. ATP/ADP translocases: A common feature of obligate intracellular amoebal symbionts related to chlamydiae and rickettsiae. **J Bacteriol** 186: 683-691.
83. Horn M, Collingro A, Schmitz-Esser S, Beier CL, Purkhold U, Fartmann B, Brandt P, Nyakatura GJ, Droege M, Frishman D, Rattei T, Mewes HW, Wagner M. 2004. Illuminating the evolutionary history of chlamydiae. **Science** 304: 728-730.
84. Haferkamp I, Schmitz-Esser S, Linka N, Urbany C, Collingro A, Wagner M, Horn M, Neuhaus HE. 2004. A candidate NAD<sup>+</sup> transporter in an intracellular bacterial symbiont related to chlamydiae. **Nature** 432: 622-625.
85. Horn M, Wagner M. 2004. Bacterial endosymbionts of free-living amoebae. **J Euk Microbiol** 51: 509-514.
86. Adamczyk J, Hesselsoe M, Iversen N, Horn M, Lehner A, Nielsen PH, Schloter M, Roslev P, Wagner M. 2003. The isotope array, a new tool that employs substrate-mediated labeling of rRNA for determination of microbial community structure and function. **Appl Environ Microbiol** 69: 6875-6887.
87. Hutter G, Schlagenhaut U, Valenza G, Horn M, Burgemeister S, Claus H, Vogel U. 2003. Molecular analysis of bacteria in periodontitis: evaluation of clone libraries, novel phylotypes and putative pathogens. **Microbiology** 149: 67-75.
88. Loy A, Horn M, Wagner M. 2003. probeBase - an online resource for rRNA-targeted oligonucleotide probes. **Nucleic Acids Res** 31: 514-516.
89. Thoms C, Horn M, Wagner M, Hentschel U, Proksch P. 2003. Monitoring microbial diversity and natural products profiles of the sponge *Aplysina cavernicola* following transplantation. **Mar Biol** 142: 685-692.

90. Wagner M, Horn M, Daims H . 2003. Fluorescence in situ hybridisation for the identification and characterisation of prokaryotes. **Curr Opin Microbiol** 6: 302-309.
91. Collingro A, Walochnik J, Baranyi C, Michel R, Wagner M, Horn M, Aspöck H. 2004. Chlamydial endocytobionts of free-living amoebae differentially affect the growth rate of their hosts. **Europ J Protist** 40: 57-60.
92. Beier CL, Horn M, Michel R, Schweikert M, Gortz HD, Wagner M. 2002. The genus *Caedibacter* comprises endosymbionts of *Paramecium* spp. related to the *Rickettsiales* (*Alphaproteobacteria*) and to *Francisella tularensis* (*Gammaproteobacteria*). **Appl Environ Microbiol** 68: 6043-6050.
93. Hentschel U, Hopke J, Horn M, Friedrich AB, Wagner M, Hacker J, Moore BS. 2002. Molecular evidence for a uniform microbial community in sponges from different oceans. **Appl Environ Microbiol** 68: 4431-4440.
94. Horn M, Fritsche TR, Linner T, Gautom RK, Harzenetter MD, Wagner M. 2002. Obligate bacterial endosymbionts of *Acanthamoeba* spp. related to the  $\beta$ -subclass of *Proteobacteria*: proposal of '*Candidatus* Procabacter acanthamoebae' gen. nov., sp. nov. **Int J Syst Evol Microbiol** 52: 599–605.
95. Poppert S, Essig A, Marre R, Wagner M, Horn M. 2002. Detection and differentiation of chlamydiae by fluorescence in situ hybridization (FISH). **Appl Environ Microbiol** 68: 4081-4089.
96. Skriwan C, Fajardo M, Hagele S, Horn M, Wagner M, Michel R, Krohne G, Schleicher M, Hacker J, Steinert M. 2002. Various bacterial pathogens and symbionts infect the amoeba *Dictyostelium discoideum*. **Int J Med Microbiol** 291: 615-624.
97. Horn M, Harzenetter MD, Linner T, Schmid EN, Muller KD, Michel R, Wagner M. 2001. Members of the *Cytophaga-Flavobacterium-Bacteroides* phylum as intracellular bacteria of acanthamoebae: proposal of '*Candidatus* Amoebophilus asiaticus'. **Environ Microbiol** 3: 440-449.
98. Horn M, Wagner M. 2001. Evidence for additional genus-level diversity of *Chlamydiales* in the environment. **FEMS Microbiol Lett** 204: 71-74.
99. Fritsche TR, Horn M, Wagner M, Herwig RP, Schleifer KH, Gautom RK. 2000. Phylogenetic diversity among geographically dispersed *Chlamydiales* endosymbionts recovered from clinical and environmental isolates of *Acanthamoeba* spp. **Appl Environ Microbiol** 66: 2613-2619.
100. Horn M, Wagner M, Muller KD, Schmid EN, Fritsche TR, Schleifer KH, Michel R. 2000. *Neochlamydia hartmannellae* gen. nov. sp. nov. (*Parachlamydiaceae*), an endoparasite of the amoeba *Hartmannella vermiformis*. **Microbiology** 146: 1231-1239.
101. Kanagawa T, Kamagata Y, Aruga S, Kohno T, Horn M, Wagner M. 2000. Phylogenetic relationships of filamentous bacteria of the Eikelboom Type 021N isolated from bulking activated sludge and development of an encompassing set of 021N-specific oligonucleotide probes. **Appl Environ Microbiol** 66: 5043-5052.
102. Fritsche TR, Horn M, Seyedirashti S, Gautom RK, Schleifer KH, Wagner M. 1999. In situ detection of novel bacterial endosymbionts of *Acanthamoeba* spp. phylogenetically related to members of the *Rickettsiales*. **Appl Environ Microbiol** 65: 206-212.
103. Horn M, Fritsche TR, Gautom RK, Schleifer KH, Wagner M. 1999. Novel Bacterial Endosymbionts of *Acanthamoeba* isolates related to the *Paramecium* Symbiont *Caedibacter caryophilus*. **Environ Microbiol** 1: 357-367.

*Book chapters and other publications*

1. Siegl A, Horn M. 2012. Lessons from environmental chlamydiae. In **Chlamydiales**, pp. 51-73. (Tan M, Bavoil P, eds.) ASM Press, Washington DC.
2. Horn, M., Collingro, A., Schmitz-Esser, S., Wagner, M. (2006). Environmental chlamydia genomics. In **Chlamydia: genomics and pathogenesis**, pp. 25-44 (Bavoil PM, Wyrick P B, eds.) Horizon Scientific Press, Norfolk.
3. Collingro, A., Horn, M. (2005). Chlamydien als Symbionten frei lebender Amöben. **Biospektrum** 4, 393-394.
4. Collingro, A., Horn, M., Wagner, M. (2004). Die Evolution der Chlamydien - Einblicke in die Entwicklungsgeschichte bedeutender bakterieller Krankheitserreger aus einer genomischen Perspektive. **GenomXPress** 2, 13-14.
5. Hentschel, U., Fieseler, L., Wehrl, M., Gernert, C., Steinert, M., Hacker, J., Horn, M. (2003). Microbial diversity of sponges. pp. 59-88. In W. E. G. Müller (ed.), **Marine Molecular Biotechnology**. Springer-Verlag, Berlin Heidelberg.
6. Horn, M. (2002). The *Parachlamydiaceae*. In Michael E. Ward (ed), **www.chlamydiae.com**. <http://chlamydiae.com/twiki/bin/view/Classification/ParaChlamydiaceae>
7. Hu J., Limaye A. P., Fritsche T. R., Horn M., Juretschko S., Gautom R. (2001). Direct detection of *Legionellae* in respiratory tract specimens using fluorescence in situ hybridization. p. 221-224. In R. Marre (ed), **Legionella**. Amer. Soc. Microbiol. Press, Washington, D.C
8. Schleifer, K.-H., Horn, M. (2000). Mikrobielle Vielfalt. **Biologen heute** 452, 1-5.
9. Horn, M., Wagner, M. (2001). Dasein im Verborgenen: Die Bakterien der Acanthamöben. **Biologie in unserer Zeit** 31, 160-168.