

## Priv.-Doz. DI Dr. Angela SESSITSCH



ARC Seibersdorf research GmbH,  
Dept. of Bioresources

### Persönliches

geboren 1. Juni 1964 in Graz

Sprachen: Deutsch (Muttersprache), Englisch (fließend), Französisch (gute Sprachkenntnisse),  
Spanisch (gute Sprachkenntnisse), Italienisch (Grundkenntnisse)

Familie: verheiratet, 1 Tochter (3 Jahre), 2 Kinder meines Mannes (20 und 17 Jahre)

### Ausbildung

2003: Inst. of Soil Science and Center of Applied Genetics at the University of Natural Resources and Applied Life Sciences, Vienna, Austria

“**Venia docendi**” (Habilitation) in Microbial Ecology. Habilitation title:  
“Phylogenetic markers for the analysis of soil and plant-associated bacterial communities”

1992-1997: Wageningen Agricultural University, The Netherlands. Department of Microbiology, Molecular Microbial Ecology; **Ph.D.**; Thesis advisors: Prof. Willem de Vos and Dr. Antoon Akkermans. Dissertation title: “Molecular Markers to Study Competition and Diversity of Rhizobium”

1990-1991: University of Technology, Vienna, Austria. Partial participation in post-graduate studies on economics and law

1982 - 1990: University of Technology, Graz, Austria. **M.Sc. in Chemical Engineering** (Bio- and Food chemistry) with honours. Thesis title: “Evaluating the Efficiency of a Hydrobotanical Sewage Plant by Chemical and Microbiological Parameters after Seven Years of Operation”

### Berufslaufbahn

2004 – present: Head of Department (Dept. of Bioresources) at the ARC Seibersdorf research GmbH consisting of a staff of 20 scientists and technicians and of app. 20 contracted researchers. The Department performs research on plant genomics, plant-microbe interactions, microbial ecology, and microarray technology, and

hosts a plant genetic resource centre. The group directly supervised by Dr. Sessitsch studies beneficial plant-microbe interactions, functional genomics of soil and plant-associated bacteria and the development of high-throughput diagnostic tools for the analysis and detection of environmental and food microorganisms. Dr. Sessitsch is further responsible for market-oriented research and product development as well as analytical services in order to warrant the income of the Department.

- 2002 – 2004: Microbiologist at the ARC Seibersdorf research GmbH, leader of the "Molecular Microbial Ecology" group, Dept. of Biotechnology  
Research on the molecular ecology and functional genomics of beneficial plant-microbe interactions, soil microbiology, biosafety of GMOs, bioremediation, development of diagnostic DNA microarrays; Teaching of graduate and undergraduate students
- 1999 – 2002: APART habilitation fellowship from the Austrian Academy of Sciences. Research on molecular ecology of soil and plant-associated bacteria; Teaching of graduate and undergraduate students
- 1998 – 1999: Herta-Firnberg fellowship at the Division of Life Sciences, Austrian Research Centre Seibersdorf, Austria. Research on soil-plant-microbe interactions
- 1997: Post-doctoral position at the Wageningen Agricultural University, Department of Microbiology, Wageningen, The Netherlands. Research on the ecology of *Lactobacillus* spp. in the large intestine of the human gastrointestinal tract  
IAEA expert mission to Ghana. Teaching of molecular biology techniques in *Rhizobium* research
- 1996 – 1997: Microbiologist at the FAO/IAEA Agricultural and Biotechnology Laboratory Seibersdorf, Austria. Research on the ecology of *Rhizobium*; development of the "CelB Gene Marking Kit". Training of research fellows. Employer: International Atomic Energy Agency (IAEA)
- 1994 – 1996: Associate Professional Officer at the FAO/IAEA Agricultural and Biotechnology Laboratory Seibersdorf, Austria.  
Development and use of molecular biology techniques to study microbial ecology of *Rhizobium* (competition and diversity) to be used in developing countries.  
Technology transfer by training of fellows, by the development of a "GUS Gene Marking Kit" and its distribution to several countries.

Consultancies and Teaching in Mexico and Brazil.

Employer: Food and Agriculture Organization (FAO)

1994: Research on marker genes at the Center for the Application of Molecular Biology to International Agriculture (CAMBIA), Canberra, Australia

1990 – 1994: Research on Biological Nitrogen Fixation at the FAO/IAEA Laboratories Seibersdorf, Austria. Construction of marker gene cassettes for the identification of Rhizobium in order to enhance biological nitrogen fixation.

Employer: International Atomic Energy Agency (IAEA)

### Aktuelles Arbeitsgebiet

- Diversity and function of plant-associated bacteria, particularly of endophytes, in relation to plant growth promotion, biocontrol, phytoremediation, mobilization of heavy metals and novel enzymatic activities with relevance for industrial application
- Interaction of plants and non-pathogenic bacteria in order to understand how microorganisms influence plant gene regulation, plant defence reactions and the production of health-related metabolites
- Soil microbiology of natural forest soils: diversity and functional activities in N turnover of soil microorganisms of a virgin forest, correlation to vegetation, climate and soil physical and chemical parameters
- Development and application of high throughput molecular techniques (diagnostic microarrays) for the analysis of methane oxidizing bacteria, molecular serotyping of Salmonella and water pathogens

### Laufende Forschungsprojekte

- **Ammonia oxidizing and nitrate reducing bacteria in a virgin forest soil: functional diversity and search for novel genes**, funded by: National Science Foundation (FWF)  
The project is aiming at analysing bacterial activities in N turnover of a virgin forest soil. The diversity of bacterial genes responsible for ammonium oxidation and nitrate reduction and their expression under various conditions are studied. Metagenomic approaches are used to search for novel nitrite and nitrate reductases of unculturable or yet uncultured bacteria.
- **Genomics for a better environment: molecular mechanisms involved in the metal accumulation by Salix caprea populations and associated microorganisms**, funded by: Vienna Foundation of science and technology (WWTF)  
In this cooperation project we look at the role of bacteria in the accumulation of Zn in willows (*Salix caprea*). Bacteria affecting the accumulation process are identified and the responsible molecular mechanisms are identified.
- **Development of a second generation of microbial diagnostic microarray methodology meeting the requirements for clinical and food microbiology in terms of sensitivity, specificity, resolution and speed**, funded by: National Science Foundation (FWF translational)  
This project aims at the further development, validation and application of already developed microarrays for pathogen (mainly Salmonella) detection in food samples

- **Bacterial endophytes, a novel bioresource for biocatalytic, environmental and agricultural applications**, funded by: National Science Foundation (FWF translational) Metagenomic approaches are used to screen for novel enzymatic activities of bacterial endophytes.
- **Molecular Ecology of Trichoderma in European forest soil**, funded by: National Science Foundation (FWF)  
In this cooperation project we are responsible for the development of a microarray to identify known Trichoderma species
- **Development of diagnostic microarrays**, funded by: ARC Seibersdorf research GmbH  
Development of microarrays for the detection and identification of Salmonella serotypes in food samples and water pathogens.
- **Role of bacterial endophytes in the phytoremediation of diesel oil**, funded by: ARC Seibersdorf research GmbH  
The interaction between endophytes and plants in phytoremediation processes is analysed. The contribution of endophytes in the biodegradation process as well as the role and ecology of endophyte plasmids are analysed.
- **Effect of endophytes on plant gene expression and food quality determinants**, funded by: ARC Seibersdorf research GmbH  
In this project the effect of non-pathogenic bacterial endophytes on the expression of selected plant candidate genes involved in stress response or disease resistance are analysed and correlated with phenotypic observations and plant physiology responses.

### Mitgliedschaften

- Nominated by the European Food Safety Authority (EFSA) as member of the Scientific Panel on Genetically Modified Organisms, evaluating applications on the import and release of genetically modified organisms in the EU regarding food and environmental safety, since 2003
- Member of the Austrian Commission of Gene Technology, since 1999
- Österreichische Gesellschaft für Biotechnologie (chairing committee)
- Österreichische Gesellschaft für Bodenkunde
- Österreichische Gesellschaft für Bodenbiologie
- American Society for Microbiology
- International Society of Microbial Ecology

### Auszeichnungen

- 1999-2002      APART fellowship (Austrian Academy of Sciences)  
2003              Winner of the ARC Science Award

### Scientific Community Services

- Nominated by the **European Food Safety Authority** (EFSA) as member of the Scientific Panel on Genetically Modified Organisms, since 2003
- Chair of the **platform “Microbial Ecology”** (Austrian Society for Biotechnology)
- Member of the **Editorial Board** of FEMS Microbiology Ecology (from 2006)

Eine Initiative des Bundesministeriums für Verkehr, Innovation und Technologie im Rahmen von fFORTE

- **Reviewing activities** for the journals FEMS Microbiology Ecology, Soil Biology & Biochemistry, Molecular Ecology, Plant & Soil, Canadian Journal of Microbiology, International Journal of Phytoremediation, Biology and Fertility of Soils, Water and Environmental Research, Australian Journal of Agricultural Research, Journal of Biotechnology, Environmental Biosafety Research

#### Conference organization

- ISME-11, 20-25 August 2006, Vienna, Austria. Member of Local Organizing Committee. Convenor of the Session "Interactions between prokaryotes and plants".
- Rhizosphere 2004, 12-17 September 2004, Munich, Germany. Member of Steering and Scientific Committee
- EUROSIL 2004, 5-12 September 2004, Session organizer
- Minisymposium on Microbial Ecology: From Ecosystem Functioning to Biotechnology Application, Vienna, 22 March 2004
- International symposium on the impact of GMOs: soil microbiology and nutrient dynamics (IGMO), Vienna, 3-6 November 2002; Chairperson of the Scientific Committee; Member of the Organizing Committee
- Organization and moderation of a workshop on "Ökologische Begleitforschung zur Freisetzung gentechnisch veränderter Pflanzen in Österreich", Vienna, 12 November 1998

#### Teaching activities

- Since 2001: teaching at the Agricult. Univ. Vienna / Inst. of Soil Science ("Molecular microbial ecology of soils")
- SS 2004: "Neue Aspekte der mikrobiellen Ökologie terrestrischer Systeme"
- WS 2004/2005 and WS 2005/2006: Contribution to LV "Konzepte der Ökologie" (organized by M. Wagner/A. Richter)
- WS 2002: lab course at the University of Hohenheim / Inst. of Soil Science ("Molecular methods in microbial ecology")
- Teaching in international courses (1995, 1996) organized by the European Environmental Research Organization (EERO) on "Introduction of genetically modified organisms into the environment: biosafety aspects" ("The gusA marker gene")
- Supervision and teaching of research fellows at the FAO / IAEA Laboratory
- Teaching of students at Univ. of Accra / Inst. of Soil Science, Ghana (1997) (4 weeks lab course on molecular methods for the identification of rhizobia)
- Teaching of students at EMBRAPA, Seropedica, Brazil (1995) (2 weeks lab course on molecular methods for the identification of rhizobia)
- Teaching of students at CINVESTAV, Irapuato, Mexico (1995) (4 weeks lab course on molecular methods for the identification of rhizobia)

#### Supervision of students

- 4 Diploma students and 10 Ph.D. students, amongst others Maria Tesar, winner of the Shell "She-Study-Award", and Melanie Kuffner, who receives a DOC fellowship from the Austrian Academy of Sciences

### Aktivitäten zur Förderung von Frauen

Förderung und Mentoring von Frauen (Studenten, post-docs, wissenschaftliche Mitarbeiterinnen) im von mir geleiteten Dept. of Bioresources der ARC Seibersdorf research GmbH. Insbesondere Frauen mit Kindern werden bestärkt ihre wissenschaftliche Karriere weiter zu verfolgen. Es ist geplant ein interdisziplinäres, Technologie-orientiertes Graduiertenkolleg, in dem ausschließlich Doktorandinnen und Betreuerinnen beteiligt sind, in der ARC Seibersdorf research GmbH zu etablieren.

### Statement „Frauen in der naturwissenschaftlich-technischen Forschung“

Die verstärkte Einbindung von Frauen in gesellschaftlich wichtigen Positionen ist von größter Bedeutung, nicht nur um das Potenzial von Frauen adequat zu nutzen, sondern auch um das gesellschaftliche Rollenbild von Frauen zu revidieren. In der naturwissenschaftlich-technischen Forschung sind Frauen nach wie vor vorwiegend in schlechteren Positionen anzutreffen oder überhaupt wenig vertreten, oft trotz einer ausgezeichneten Ausbildung. Um dieser Situation entgegenzuwirken, müssen Frauen in ihren Ambitionen bestärkt werden. Andererseits müssen Maßnahmen dahingehend gerichtet werden, dass sich die allgemeine Erwartungshaltung bezüglich des Potenzials von Frauen in Wissenschaft und Technik an die tatsächlichen Leistungen anpasst. Es bedarf ebenso einer Bereitstellung von Rahmenbedingungen, die die Vereinbarkeit von Familie und Beruf zulassen.

### Ausgewählte Publikationen (wegen des großen Umfangs ab 2004)

Stralis-Pavese, N., A. Sessitsch, A. Weilharter, T. Reichenauer, J. Riesing, J. Csontos, J.C. Murrell, and L. Bodrossy. 2004. Optimisation of diagnostic microarray for application in analysing landfill methanotroph communities under different plant covers. *Environ. Microbiol.* 6: 347-363.

Idris, R., R. Trifonova, M. Puschenreiter, W.W. Wenzel, and A. Sessitsch. 2004. Bacterial communities associated with flowering plants of the Ni-hyperaccumulator *Thlaspi goesingense*. *Appl. Environ. Microbiol.*, 70:2667-2677.

Sessitsch, A., K. Smalla, E. Kandeler, and M. H. Gerzabek. 2004. Effects of transgenic plants on soil microorganisms and nutrient dynamics. In *Plant Microbiology* (Eds. M. Gillings and A. Holmes), BIOS Scientific Publishers, London and New York.

Sessitsch, A., B. Reiter, and G. Berg 2004. Endophytic bacterial communities of field-grown potato plants and their plant growth-promoting and antagonistic abilities. *Can.J. Microbiol.*, 50:239-249.

Bodrossy, L., and A. Sessitsch. 2004. Oligonucleotide microarrays in microbial diagnostics. *Curr. Opin. Microbiol.*, 7:245-254.

Hackl, E., S. Zechmeister-Boltenstern, L. Bodrossy, and A. Sessitsch. 2004. Comparison of diversities and compositions of bacterial populations inhabiting natural forest soils. *Appl. Environ. Microbiol.*, 70:5057-5065.

Sessitsch, A., S. Gyamfi, D. Tscherko, M.H. Gerzabek, and E. Kandeler. 2004. Activity of microbes affected by the cultivation of transgenic glufosinate-tolerant oilseed rape (*Brassica napus*) and the application of the associated herbicide. *Plant & Soil*, 266:105-116.

Kirchmann, H., G. Haberhauer, E. Kandeler, A. Sessitsch, and M.H. Gerzabek. 2004. How does the level and quality of organic matter input control biological decomposition in soil? Synthesis of a long-term experiment. *Global Biogeochemical Cycles*, Vol.18, GB4011.

Compant, S., B. Reiter, A. Sessitsch, J. Nowak, C. Clement, and E. Ait Barka. 2005. Endophytic colonization of *Vitis vinifera* L. by a plant growth-promoting bacterium, *Burkholderia* sp. strain PsJN. *Appl. Environ. Microbiol.* 71:1685-1693.

Sessitsch, A., T. Coenye, A.V. Sturz, P. Vandamme, E. Ait Barka, D. Faure, B. Reiter, B.R. Glick, G. Wang-Pruski, and J. Nowak. 2005. *Burkholderia phytofirmans* sp. nov., a novel plant-associated bacterium with plant beneficial properties. *Int. J. Syst. Evol. Microbiol.* 55:1187-1192.

Stralis-Pavese, N., L. Bodrossy, T.G. Reichenauer, A. Weilharter, and A. Sessitsch. 2005. 16S rRNA-based T-RFLP for the analysis of methane oxidizing bacteria – assessment, critical evaluation of methodology performance and application for landfill cover soils. *Appl. Soil Ecol.*, in press.

Rasche, F., V. Hödl, C. Poll, E. Kandeler, M.H. Gerzabek, J.D. van Elsas, and A. Sessitsch. 2005. Rhizosphere bacteria affected by transgenic potatoes with antibacterial activities in comparison to effects of soil, wildtype potatoes, vegetation stage and pathogen exposure. *FEMS Microbiol. Ecol.*, accepted.

Kostić, T., A. Weilharter, A. Sessitsch, and L. Bodrossy. 2005. High sensitivity, PCR-free detection of microorganisms and their functional genes using 70mer oligonucleotide diagnostic microarray, *Analyt. Biochemistry*, accepted.

Reiter, B. and A. Sessitsch. 2005. The bacterial microflora in association with the wildflower *Crocus albiflorus*. *Can. J. Microbiol.*, accepted.

Sørensen, J. and A. Sessitsch. 2006. Plant-beneficial bacteria in rhizosphere and endoplant habitats - life style and molecular interactions, accepted book chapter in *Modern Soil Biology*

Sessitsch, A. 2006. Molecular markers for studying the ecology of rhizobia, accepted book chapter in *Molecular Techniques for Soil and Rhizosphere Microorganisms*.

Bodrossy, L., N. Stralis-Pavese, M. Konrad-Köszler, A. Weilharter, T.G. Reichenauer, D. Schöfer, and A. Sessitsch. 2005. mRNA-based parallel detection of active methanotroph populations using a diagnostic microarray. submitted.

Rasche, F., H. Velvis, C. Zachow, G. Berg, J.D. van Elsas, and A. Sessitsch. Impact of transgenic potatoes expressing antibacterial agents on bacterial endophytes is comparable to effects of wildtype potatoes and changing environmental conditions. submitted.

Rasche, F., E. Marco-Noales, H. Velvis, L. S. van Overbeek, M.M. Lopez, J.D. van Elsas, and A. Sessitsch. Baseline study and field assessment of potential meffects of genetically modified T4-lysozyme producing potatoes on bacterial endophytes. submitted.

Tankouo Sandjong, B., A. Sessitsch, E. Liebana, C. Kornschöber, F. Allerberger, H. Hächler, and L. Bodrossy. Towards a DNA-based identification of *Salmonella* serovars based on comparative analysis of the phylogenetic markers *gyrB* and *atpD* and the flagellin genes *fliC* and *fliB*. submitted.

Idris, R., M. Kuffner, L. Bodrossy, M. Puschenreiter, S. Monchy, W.W. Wenzel, and A. Sessitsch. Characterization of Ni-tolerant methylobacteria associated with the hyperaccumulating plant *Thlaspi goesingense* and description of *Methylobacterium goesingense* sp. nov. submitted.

### Patente

A microarray for molecular serotyping of *Salmonella* (application submitted)

### Weiterführende Links

[www.arcs.ac.at/U/UB](http://www.arcs.ac.at/U/UB) - Department Bioresources von ARC Seibersdorf

[www.arcs.ac.at/U/UB/Microbiology](http://www.arcs.ac.at/U/UB/Microbiology) - Abteilung Mikrobiologie