**EGBERT SCHWARTZ**

Department of Biological Sciences
Northern Arizona University
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## EDUCATION

**1999, Ph.D., Soil Ecology,**
**University of California, Davis, CA.**

Advisor: Dr. Kate M. Scow

Title: The effect of bioavailability and microbial community composition on phenanthrene degradation kinetics in soil.

**1991, M.Sc., Cellular and Molecular Biology,**
**University of Michigan, Ann Arbor, MI**

Advisor: Dr. Eran Pichersky

Title: Isolation and characterization of chlorophyll a/b binding genes.

**1988, B.Sc., Botany,**
**Michigan State University, East Lansing, MI.**

## PROFESSIONAL EXPERIENCE

| | |
|---|---|
| 8/18/2003 – present | Assistant Professor, Department of Biological Sciences, Northern Arizona University. |
| 2001 – 2003 | Assistant Professor, Department of Biological Sciences, University of Denver. |
| 1999- 2001 | Post-doctoral Researcher,. University of California, Berkeley. |
| 1994-1998 | Research Assistant, University of California, Davis. |
| 1993-1994 | Director of Consulting, Bitterroot Restoration Incorporated, Corvallis MT. |
| 1988-1991 | Research Assistant, University of Michigan. |

**Publications in Peer Reviewed Journals.**

1. Schwartz, E., S. Blazewicz, R. Doucett, B. A. Hungate, S. C. Hart, and P. Dijkstra. 2007. Natural Abundance $\delta^{15}N$ and $\delta^{13}C$ of DNA Extracted from Soil. Soil Biology and Biochemistry, 39:3101-3107.

2. Schwartz, E., K. Adair, and E.A.G. Schuur. 2007. Bacterial Community Structure Correlates with Decomposition Parameters Along an Hawaiian Precipitation Gradient. Soil Biology and Biochemistry, 39:2164–2167.

3. Schwartz, E. Characterization of growing microorganisms in soil through stable isotope probing with $H_2{}^{18}O$. 2007. Applied and Environmental Microbiology, 73: 2541-2546.

4. Dijkstra P., O.V. Menyailo, E. Schwartz, S. C. Hart, and B. A. Hungate. 2006. $^{13}C$ and $^{15}N$ natural abundance of the soil microbial biomass. Soil Biology and Biochemistry, 38: 3257-3266.

5. Herman, D.H., K.K. Johnson, C.H. Jaeger, E. Schwartz, and M.K. Firestone, 2006 Nitrogen processing and microbial communities in rhizosphere soil of *Avena barbata*. Soil Science Society if America Journal, 70: 1504-1511.

6. Dijkstra P., O.V. Menyailo, R.R. Doucett, S.C. Hart, E. Schwartz, and B.A. Hungate. 2006. Natural abundance $^{15}N$ signatures of the soil microbial biomass along a dung gradient European Journal of Soil Science, 57:468-475.

7. Watanabe, N., E. Schwartz, K.M. Scow, and T.M. Young. 2005. Relating Desorption and Biodegradation of Phenanthrene to SOM structure characterized by Quantitative Pyrolisis GC-MS. Environmental Science and Technology, 39, 6170-6181.

8. Tokunaga, T.K., J. Wan, T. C. Hazen, E. Schwartz, M. K. Firestone, S. R. Sutton, M. Newville, K. R. Olson, A. Lanzirotti, and W. Rao. 2003. Distribution of Chromium Contamination and Microbial Activity in Soil Aggregates. Journal of Environmental Quality 32: 541-549.

9. Schwartz, E., S.V. Trinh, and K.M. Scow. 2002. Effect of methylene chloride dosage on microbial community composition and phenanthrene degradation kinetics in soil. Journal of Environmental Quality, 31:144-149.

10. Schwartz, E. and K.M. Scow. 2001. Repeated inoculation as remediation strategy of low concentrations of phenanthrene in soil. Biodegradation, 12 (3): 201-207.

11. Tokunaga, T.K., J. Wan, M.K. Firestone, T.C. Hazen, E. Schwartz, S.R. Sutton and M. Newville. 2001. Chromium diffusion and reduction in soil aggregates. Environmental Science and Technology. 35(15): 3169-3174.

12. Schwartz, E., S.V. Trinh, and K.M. Scow, 2000. Measuring Growth of a Phenanthrene Degrading Bacterial Inoculum in Soil With a Quantitative Competitive Polymerase Chain Reaction Method. FEMS Microbial Ecology 34:1-7.

13. Schwartz, E., and K.M. Scow. 1999. Using biodegradation kinetics to measure the availability of aged phenanthrene to bacteria inoculated into soil. Environmental Toxicology and Chemistry, vol18, No. 8:1742-1746.

14. Schwartz, E., R. Stasys, R. Aebershold, J.M. McGrath, B. Green, and E. Pichersky. 1991. Sequence of a tomato gene encoding a third type of LHC II chlorophyll a/b-binding polypeptide, Plant Molecular Biology, 17:923-925.

15. Schwartz, E., D. Shen, R. Aebershold, J.M. McGrath, B. Green and E. Pichersky. 1991. Nucleotide Sequence and chromosomal location of Cab 11 and Cab 12, the genes for the fourth polypeptide of the Photosystem I light harvesting antenna (LHCI). FEBS, Vol 280, No. 2:229-234.

16. Piechulla, B., J.W. Kellmann, E. Pichersky, E.Schwartz, and H.H. Forster. 1991. Determination of steady state mRNA levels of individual chlorophyll a/b-binding protein genes of the tomato cab gene family. Molecular and General Genetics. 230: 413-422.

17. Guiamet, J.J., E.Schwartz, E. Pichersky and L.D. Nooden. 1991 Characterization of cytoplasmic and nuclear mutations affecting chlorophyll and chlorophyll-binding proteins during senescence in soybean. Plant Physiology 96, 227-231.

18. Schwartz, E. and E. Pichersky. 1990 Sequence of two tomato genes encoding chlorophyll a/b-binding proteins of CP-24, a PS-II antenna component. Plant Molecular Biology, 15:157 -160.

**Non peer reviewed publications**

1. Scow, K.M., E. Schwartz, M.J. Johnson, and J.L. Macalady. 2001. Microbial biodiversity, measurement of. In: Encyclopedia of Biodiversity, 4:177-190.

2. Burke, P., H. Atthowe, and E. Schwartz. 1994. Atlas Mine Revegetation Pilot Project Report. Bureau of Land Management, Dept. of Interior.

**CONTRIBUTED ABSTRACTS (since 2004)**

1. Egbert Schwartz. Soil Genomics and the Nitrogen Cycle across an Elevation Gradient in Northern Arizona. Ecological Society of America national meetings. August 5-10. 2007, San Jose CA.

2. Stephen C. Hart, Gregory S. Newman, Paul C. Selmants, Karen Adair, Egbert Schwartz, Kristin Haskins, Valerie Kurth, and Andrew Kowler. Covariance between ecosystem processes and soil microbial community structure along three

million years of ecosystem development in Northern Arizona. Ecological Society of America national meetings. August 5-10. 2007, San Jose CA.

3. Jeffrey S. Coyle, Paul C. Selmants, Paul Dijkstra, Egbert Schwartz, Stephen C. Hart, Bruce A. Hungate.Temporal variability of $^{15}N$ enrichment of the soil microbial biomass along a semiarid substrate age gradient Ecological Society of America national meetings. August 5-10. 2007, San Jose CA.

4. Paul Dijkstra, Jeffrey S. Coyle, Corinne M. LaViolette, Paul C. Selmants, Egbert Schwartz, Stephen C. Hart, Bruce A. Hungate. A trail of isotopes from food webs to ecosystems Ecological Society of America national meetings. August 5-10. 2007, San Jose CA.

5. Corinne M. LaViolette, Paul Dijkstra, Stephen C. Hart, Egbert Schwartz, Richard R. DoucettBruce A. Hungate. $^{15}N$ natural abundance of the soil microbial biomass as a measurement of net N mineralization. Ecological Society of America national meetings. August 5-10. 2007, San Jose CA.

6. Jane Marks, Brenda Harrop, Egbert Schwartz, Daniel Kellerman, Mary Watwood, Sally Nelson, Rebekka Rieder, Rebekka Rieder, Erin Hisrich. Environmental Controls on Microbial Communities in Fossil Creek, a Travertine Stream in Central Arizona. American Society of Microbiology107$^{th}$ General Meeting May 21 through25, 2007, Toronto, Canada.

7. Karen Adair and Egbert Schwartz. Ammonia oxidizing bacteria and ammonia oxidizing archaea in Arizona and Hawaii soils. Soil Ecological Society National Meetings, May 15$^{th}$, 2007, Moab, UT.

8. Steve Blazewicz and Egbert Schwartz. Quantification of Microbial Growth in Soil by Measurement of 18O Incorporation into DNA or Soil from 18O-water. Soil Ecological Society National Meetings, May 15$^{th}$, 2007, Moab, UT.

9. Egbert Schwartz. Identification of newly grown microorganisms in soil through stable isotope probing with $^{18}O$-water.' Ecological Society of America national meetings. August 4-11, 2006, Memphis TN.

10. Karen Adair and Egbert Schwartz A Comparison of Ammonia-Oxidizing Communities in Northern Arizona Soils. The Forty Fifth Annual Meeting of the Arizona-Nevada Branch of the American Society for Microbiology, February 25$^{th}$, 2005, Las Vegas NV.

11. Karen Adair and Egbert Schwartz. Ammonia-oxidizing bacteria and ammonia-oxidizing archaea: Who is dominant in northern Arizona soils? Ecological Society of America national meetings. August 4-11. 2006, Memphis TN.

12. Jeffrey Coyle, Paul Dijkstra, Egbert Schwartz, Stephen Hart, Paul Selmants, and Bruce Hungate. $^{15}N$ natural abundance of the microbial biomass along a semi-arid soil age gradient. Ecological Society of America national meetings. August 4-11. 2006, Memphis TN.

13. Maria Ochoa, Sally Nelson, Jane Marks, Brenda Harrop, Rebekka Rieder, Mary Watwood, Egbert Schwartz. Characterization of the Microbial Community Decomposing Leaf Litter along the Travertine Gradient in Fossil Creek, Arizona Prior to River Restoration. American Society of Microbiology106th General Meeting May 21 through 25th, 2005, Orlando, FL.

14. Steve Blazewicz and Egbert Schwartz. Combination of Cell Lysis and Transesterification of Cell Lipids for Biodiesel Production using the Diatom *Cyclotella cryptica* Second Annual Celebration of Research and Design Northern Arizona University April 28, 2006.

15. Steve Blazewicz and Egbert Schwartz. Quantification of microbial growth in soil by measurement of $^{18}O$ incorporation into DNA from $^{18}O$-water.' Ecological Society of America national meetings. August 4-11, 2006, Memphis TN.

16. Steve Blazewicz and Egbert Schwartz. Combination of Cell Lysis and Transesterification of Cell Lipids for Biodiesel Production using the Diatom *Cyclotella cryptica* Second Annual Celebration of Research and Design Northern Arizona University April 28, 2006.

17. Egbert Schwartz. Identification of newly grown microbial populations in soil through stable isotope probing with [$^{18}O$]water. AGU Fall Meeting, 5-9 December, 2005, San Francisco, CA.

18. Paul Dijkstra, Egbert Schwartz, Steve Hart, Richard Doucette and Bruce Hungate The $^{15}N$ /$^{14}N$ and 13C/12C natural abundance isotope composition of microbial biomass or DNA in soil. AGU Fall Meeting, 5-9 December, 2005, San Francisco, CA.

19. Egbert Schwartz, Paul Dijkstra, Richard Douchett, Steve C. Hart, and Bruce Hungate. Natural $^{15}N$ Abundance of the Soil DNA Reflects Carbon or Nitrogen Limitation of Microorganisms in Soil. American Society of Microbiology105th General Meeting June 5 through June 9, 2005, Atlanta, GA.

20. Karen Adair, Steve Hart, Bruce Hungate and Egbert Schwartz. Relationship Between Molecular Characteristics of Ammonia-Oxidizing Bacteria Communities and Nitrification Rates American Society of Microbiology105th General Meeting June 5 through June 9, 2005, Atlanta, GA.

21. Steven Blazewicz, Rhett Pepe, and Egbert Schwartz. Oxygen as an Electron Acceptor in Microbial Fuel Cells Second Annual Celebration of Research and Design Northern Arizona University April 29, 2005.

22. Paul Dijkstra, Oleg Menyailo, Egbert Schwartz, Steve Hart, Richard Doucett, and Bruce Hungate. $^{15}N$ natural abundance of the soil microbial biomass: measurement, interpretation and use in biogeochemistry. Ecological Society of America national meetings, August 2-6, 2004, Portland OR.

23. Paul Dijkstra, Richard Doucett, Steve Hart, L Boring, Egbert Schwartz, and Bruce Hungate. Soil Microbial $^{15}N$-Natural Abundance is Enriched Relative to Other Soil N Pools and Indicates Microbial C-Limitation. AGU Fall Meeting, December6-10 2004, San Francisco, CA.

## INVITED PRESENTATIONS

1. E. Schwartz. Soil Genomics and the Nitrogen Cycle across an Elevation Gradient in Northern Arizona. in symposium entitled: "Microbial Communities along Environmental Gradients: Linking Microbial Ecology and the Ecosystem" Ecological society of America meeting symposium, San Jose, CA. August 5-10, 2007 invited by Mark Waldrop USGS, Menlo Park CA.

2. E. Schwartz. Renewable Energy from Microorganisms; Microbial Fuel Cells and Biodiesel from Algae. Department of Electrical Engineering Seminar, Northern Arizona University. April 6th 2007. invited by Niranjan Venkatraman, Northern Arizona University.

3. E. Schwartz, B. Hungate, P. Keim and M. Cummings. Can soil genomics predict the impact of precipitation on nitrous oxide flux from soil? DOE Program for Ecosystem Research, P.I. meeting. Rhinelander WI, June 19th-21st, 2007 invited by Jeff Amthor, Department of Energy.

4. E. Schwartz. Stable isotope analysis in DNA: a powerful new tool in microbial ecology. American Society of Microbiology Regional Meeting, February 24th, 2006. Invited by Brian Hedlund, University of Nevada Las Vegas.

5. E. Schwartz. Soil Genomics and the nitrogen cycle across an elevation gradient in Northern Arizona. Department of Soil, Water, and Environmental Science seminar, University of Arizona. October 16th, 2006. Invited by Craig Rasmussen, University of Arizona.

6. E. Schwartz, B. Hungate, P. Keim and M. Cummings. Can soil genomics predict the impact of precipitation on nitrous oxide flux from soil? DOE Program for Ecosystem Research, P.I. meeting. Manhattan KS May 3-4, 2006 invited by Jeff Amthor, Department of Energy.

7. E. Schwartz, B. Hungate, P. Keim and M. Cummings. Can soil genomics predict the impact of precipitation on nitrous oxide flux from soil? DOE Program for Ecosystem Research, P.I. meeting Flagstaff AZ, April 12-13, 2005. invited by Jeff Amthor, Department of Energy.

8. E. Schwartz. "A new perspective on ecosystem processes through isotopic analysis of bio-molecules extracted from soil". School of Forestry Seminar, Northern Arizona University. February 23rd, 2005. invited By Tom Kolb, Northern Arizona University

9. E. Schwartz Natural $^{15}N$ Abundance of Soil DNA Reflects Carbon or Nitrogen Limitation of Microbial Growth in Soil. 3rd Annual National Science Foundation

Microbial Observatories P.I. Workshop September 12 -15, 2004. Invited by Anna Palmisano, United States Department of Agriculture.

**EDUCATION GRANTS FUNDED (lead P.I. listed first)**

1. Egbert Schwartz, 2006. NSF RET supplemental funding for grant from National Science Foundation, Ecosystem Program entitled $^{15}N$ natural abundance of soil microbial biomass as a tool for assessing controls on N-cycling processes in ecosystems, $10,000.

2. Maribeth Watwood, Bruce Hungate, Tom Whitham, Amy Whipple, Egbert Schwartz. 2006-2011. NSF IGERT program. NAU–IGERT Program - Integrative Bioscience: Genes to Environment - $2,869,440.

3. Egbert Schwartz and Maribeth Watwood. 2005 – 2008. NSF CCLI program. Adaptation and implementation of an inquiry-based water quality laboratory curriculum. $ 99,992.

4. Egbert Schwartz and Maribeth Watwood. 2004. prop 301 class room support. Biotechnological Curriculum Emphasizing Water Quality and Bioremediation in BIO 369, Environmental Microbiology. $6,000.

**RESEARCH GRANTS FUNDED (lead P.I. listed first)**

1. George Koch, Egbert Schwartz, Bruce Hungate, Thomas Kolb, and Darrell Kaufman. 2007. NSF MRI program. MRI: Acquisition of Off-450000+1203Axis Integrated-Cavity Output Spectroscopy Instruments for Ecological Research and Training at Northern Arizona University - $161,440.

2. Egbert Schwartz. 2007. Carbon dioxide mitigation and biodiesel production with the lipid accumulating micro algae Cyclotella cryptica. ERDENE $25,000.

3. Gery Allan, Egbert Schwartz, Catherine Gehring, and Cathy Propper. 2007. Acquisition of a Real-Time PCR Instrument for Diverse Applications in the Biological Sciences. TRIF, Growing Biotechnology Initiative. $43,282.

4. Craig Rasmussen, Jon Chorover, and Egbert Schwartz, 2007 - 2009, NSF Ecosystems Program - Collaborative Research: Is Aluminum the Primary Controller of Soil Carbon Biodegradation in Temperate Forest Systems? - $600,000.

5. Paul Dijkstra, Bruce Hungate, Egbert Schwartz, and Steve Hart, 2005 -2008, US Department of Agriculture, Predicting nitrogen mineralization from the $^{15}N$ signature of soil microbial biomass, $350,000.

6. Maribeth Watwood, Egbert Schwartz, and Bruce Hungate, 2005, ERDENE. NAU - BIORIN BIOremediation Research Initiative; $74,962.

7. Nancy Johnson, Catherine Gehring, Maribeth Watwood, and Egbert Schwartz. 2005. Meriam Powell Center Grant - Solving the Mystery of Yield Decline in Crops by Measuring $^{13}C$ assimilation into mycorrhizal DNA and RNA $9,840.

8. Maribeth Watwood and Egbert Schwartz . 2005. TRIF - isotopic labeling of viral genomes: A new tool for identifying bacteriophage that attack pollutant-degrading bacteria - $ 22,000.

9. Egbert Schwartz. 2004. Northern Arizona University Intramural Program. Isolation of bacteria that transform arsenic in sediments from Montezuma Well. $7,500.

10. Egbert Schwartz. 2004 . Prop. 301 minigrant. Electricity generation from compost; a microbial fuel cell that runs on rotting fruits and vegetables. $ 22,000.

11. Egbert Schwartz, Bruce Hungate, Stephen Hart and Paul Dijkstra. 2004-2008. National Science Foundation, Ecosystem Program. $^{15}N$ natural abundance of soil microbial biomass as a tool for assessing controls on N-cycling processes in ecosystems - $450,000.

12. Egbert Schwartz, Bruce Hungate, Paul Keim and Michael Cummings. 2004-2008 Department of Energy PER program. Can soil genomics predict the impact of precipitation on nitrous oxide fluxes from soil? - $1,203,536.

13. Maribeth Watwood, Bruce Hungate, Egbert Schwartz. ERDENE. 2004 NAU - BIORIN BIOremediation Research Initiative; $39,119.

14. Bruce Hungate, George Koch, Steve Hart, Paul Keim, Egbert Schwartz, Maribeth Watwood, Alice Gibb. 2004. Prop. 301. infrastructure Award. Stable Isotope Forensics: Emerging Biotechnology. $125,000.

15. Egbert Schwartz, Prop. 301 minigrant. 2003. A microbial fuel cell powered by cellulose and iron reducing Clostridium or Bacillus bacteria. $15,000.

16. Mary Firestone, Whendee Silver, Gary Sposito and Egbert Schwartz. 2001-2005. Mellon Foundation. Is the Biogeochemistry of Iron a Primary Controller of Phosphorus and Nitrogen Availability in tropical Forest Soils? $ 145,000.

17. Steve Schmidt, University of Colorado, Boulder, NSF Microbial Observatories, 2002, subcontract, Microbial Biogeochemistry and Functional Diversity across the Forest-Tundra Ecotone in the Rocky Mountains. $10,000.

18. Phil Danielson, Bob Dores, Tom Quinn, Egbert Schwartz, Jim Fogleman. 2002. NSF equipment Grant – WAVE HPLC denaturant machine. $ 107,296.

19. Egbert Schwartz. 2001. Office of internationalization, University of Denver, International travel grant – Travel to Costa Rica – $1,000.

20. Egbert Schwartz and Eran Pichersky. 1991. Cellular and Molecular Biology Block Grant. Isolation and characterization of chlorophyll A/B binding genes from tomato. University of Michigan, Ann Arbor, MI. $ 2,000.

## UNDERGRADUATE RESEARCH GRANTS FUNDED

1. Zachary Walker. 2007. Henry Hooper Award, Northern Arizona University. Effect of Cattle Grazing on Relative Abundance of Soil Fungi and Bacteria. $500.

2. Rhett Pepe and Steve Blazewicz. 2006. Henry Hooper Award, Northern Arizona University, Alterations to environmental conditions to enable bacteria to use cellulose as a fuel for producing electricity, $500.

3. Jessica Collins. 2003. Partners in Scholarship Program, University of Denver. Are coliform bacteria, including *E.coli*, present in three different streams in Denver? $1,000.

4. Mellisa Ferris. 2003. Partners in Scholarship Program, University of Denver. Sequencing and Isolation of Iron-Reducing *Clostridium* in Colorado Alpine Tundra. $1,000.

5. Jason Hrcek. 2002. Partners in Scholarship Program, University of Denver. Characterization of clostridia bacteria in a tropical soil from Puerto Rico. $1,000.

6. Erin Loewen. 2002. Partners in Scholarship Program, University of Denver. isolation and identification of Geobacter bacteria from a tropical soil in Puerto Rico. $1,000.

7. Karen Adair. 2002. Partners in Scholarship Program, University of Denver. Isolation and identification of chromium resistant bacteria from a California soil, $1,000.

## TEACHING EXPERIENCE

*Classes taught at Northern Arizona University:*

**BIO 369 – Environmental Microbiology**
Fall 2003 – 38 students
Fall 2004 – 48 students
Fall 2005 - 34 students
Fall 2006 - 24 students

**BIO 369L – Environmental Microbiology Laboratory**
Fall 2003 – 38 students
Fall 2004 – 41 students
Fall 2005 - 34 students
Fall 2006 - 23 students

**BIO 376 – Industrial Microbiology and Biotechnology**
Fall 2005 – 6 students

**BIO 344 – Cell and Molecular Biology**
Fall 2004 – 78 students
Spring 2005 – 72 students
Spring 2006 – 67 students
Spring 2007 – 65 students

**BIO 181 – Unity of Life I.**
Spring 2004 - 141 students

**BIO 181R – Recitation for Unity of Life I**
Spring 2004 – 51 students

**Bio 497 – Undergraduate Independent Study**
Spring 2004 – 7 students
Spring 2007 – 1 student

**BIO 485 – Undergraduate Research**
Spring 2005 – 2 students
Fall 2005 – 1 student
Spring 2006 – 2 students
Fall 2006 – 1 student

**Bio 698 – Graduate Seminar**
Fall 2005 – 9 students

*Teaching Experience at institutions other than Northern Arizona University:*

**General Microbiology, Spring 2002, University of Denver**, Introduction to biochemistry, physiology and diversity of bacteria, archaea, protozoa and algae.

**Graduate seminar in molecular biology, Spring 2002, University of Denver.** On the use of 16S/18S rDNA sequences to 1) categorize microorganisms, 2) detect them in the environment, and 3) describe microbial communities.

**Field course, Fall 2001 and Fall 2002, University of Denver.** One lecture in which I introduced students in the environmental science to environmental microbiology.

**General Ecology, Fall 2002, University of Denver.** Six lectures and two labs on competition, predation and food webs. Designed a lab with nematodes and *E. coli* to study predation.

**Mentoring class. Fall 2002, University of Denver.** Helped 1st year students adjust to college life.

**CEPRAP Teacher Institute: Exploring the microscopic world.** 2000. Introduced teachers to soil microbial experiments for use in middle school and high school classes. In addition discussed my research on Chromium reduction and phenanthrene degradation.

**Soil Microbial Ecology, University of California, Berkeley**. 2000. Lectured on DNA and Phospholipid Fatty Acid techniques. In addition, lectured on iron, sulfur and humic acid reduction and oxidation.

**CEPRAP Teacher Institute: Exploring the microscopic world.** 1999. Introduced teachers to soil microbial experiments for use in middle school and high school classes.

**Soil Microbial Ecology, University of California, Davis.** 1999. Lectured on molecular techniques in soil microbial ecology.

**BIOSIS Workshop at California State University, Fresno.** 1998. Introduced representatives from the EPA and NRCS to soil organisms.

**North Valley and Mountain Region Biotechnology Center.** 1998. Demonstrated gel electrophoresis to junior college faculty and students from across California.

**Soil Microbial Ecology, University of California, Davis.** 1998. Lectured on molecular techniques in soil microbial ecology and designed Soil DNA extraction experiment for lab course.

**CEPRAP Teacher Institute: Exploring the microscopic world.** 1998. Introduced teachers to soil microbial experiments that can be used in middle school classes.

**Soil Microbial Ecology**.1997. Teaching Assistant. University of California, Davis.
Instructor: Dr. K.M. Scow.

**Plant Physiology**. 1990 & 1991. Teaching Assistant. University of Michigan, Ann Arbor.
Instructor: Dr. H. Ikuma.

**Biology of Cancer**. 1989. Teaching Assistant. University of Michigan, Ann Arbor.
Instructor: Dr. L. Kleinschmidt.

## UNIVERSITY SERVICE

**Building Committee, Department of Biological Sciences, Northern Arizona University, 2005 and 2006.**

**Undergraduate Program Committee, Department of Biological Sciences, Northern Arizona University. 2003-2004** Advised students on undergraduate curriculum

*Service at the University of Denver:*
**Environmental Science Advisory Board –** Biology representative on board that makes all decisions in regard to the Environmental Science major**.**

**Curriculum Assessment Committee –** Designed and implemented online senior exit survey, helped develop assessment tools.

**Library Liaison and Advisory Board** – represent Biology department on all library decisions, including purchase of books and journals.

**Department Seminar Coordinator**- Invite and coordinate seminar speakers for the weekly Biology seminar.

**Biology Web site master -** Update and maintain the department of biology web site. Help in designing a new version of the department's website.

## PROFESSIONAL SERVICE

**Paper and grant review:**

Kearney Foundation
NSF Ecology Program
NSF Ecosystems Program
NSF Microbial Observatories Program
NSF Environmental Genomics Program
DOE Program in Ecosystem Research
International Journal of Phytoremediation
Plant and Soil
Microbial Ecology
Applied Soil Ecology
Soil Science Society of America Journal