

ANTHONY V. PALUMBO

PRESENT POSITIONS

- 2009 – Present Division Director, Biosciences Division, Oak Ridge National Laboratory (ORNL), P. O. Box 2008, Oak Ridge, TN 37831-6060. Phone: 865-574-5845, Fax: 865-574-3036, E-mail: palumboav@ornl.gov. Web: <http://www.ornl.gov/sci/ees/bsd/Palumbo.shtml>
- 2001 – Present Distinguished Scientist, Biosciences Division (previously Environmental Sciences Division - ESD), ORNL

PREVIOUS POSITIONS

- 2007-2009 Deputy Division Director, Biosciences Division
2000-2001 Section Head for Earth and Microbial Science Section, ESD
1999-2000 Science Team Leader for Biogeochemistry for ESD
1997-1999 Senior Staff and Member of the Research Council
1993-1996 Group Leader - Microbial Interactions Group, ESD, ORNL, Oak Ridge, TN.
1987-1997 Staff Member, Environmental Sciences Division
1983-1986 Research Associate, University of Tennessee, Knoxville, TN.
1981-1983 Research Associate, University of North Carolina, Chapel Hill, NC.
1979-1981 Postdoctoral Associate, Massachusetts Institute of Technology, Cambridge, Mass.
1977-1979 Biologist, National Marine Fisheries Service, Beaufort, NC.

EDUCATION

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|----------------------------------|----------------|------------|------------|
| Rensselaer Polytechnic Institute | Biology | B. S. 1973 | |
| North Carolina State University | Marine Science | M. S. 1976 | Ph.D. 1980 |

RESEARCH INTERESTS

Integration of physical, chemical, and biological remediation technologies; Microbial ecology in contaminated and pristine ecosystems; application of molecular techniques to microbial ecology.

PROFESSIONAL RECOGNITION AND AFFILIATIONS

Fellow of the American Academy for Microbiology.
Member of: American Society for Microbiology; American Society of Limnology and Oceanography; American Geophysical Union

Ad hoc reviewer: Sea Grant, DOE, and NSF Proposals, Applied Microbiology, Letters in Applied Microbiology, Water Resources Research, Limnology and Oceanography, J. of the North American Benthological Society, 1st - 4th International Symposia on "In situ and On-Site Bioreclamation", Symposia on Biotechnology for Fuels and Chemicals. NSF Panel for SBIRs on Biosensors, Bioremediation J.

Co-chair for the session "Biogeochemical transformations of contaminants in freshwater systems", at the 2010 AGU Meeting of Americas, Brazil. Co-Chair for session "Biogeochemical Controls on Fate of Mercury at Contaminated Industrial Sites" at the Fall AGU meeting, San Francisco. Co-Chair for 7th Conference on Small Genomes, Va., 1999; Co-Chair/Organizer for the "Symposium on Microbial Ecology" at the VII International Congress of Ecology, July 1998. Co-Chair for "Mechanisms Regulating Microbial Diversity and Population Dynamics" at the ASLO 99 Aquatic Sciences Meeting.

Organizer/Chair for DOE/OHER Meeting Heterogeneity at Contaminated Sites, October, 1996. Chair for “Symposium on Surfactants for Bioremediation” at the 1996 Society for Industrial Microbiology Meeting, the “Symposium on Bioavailability and Biosurfactants” at the 1994 Annual ASM Meeting; Workshop on Techniques for Bioremediation at the 1992 Annual ASM Meeting; Section on Biological Processes for Symposium on Organic Contaminants at 1990 ACS Annual Meeting.

Former Member of; US DOE OTD, Technology Support Group, Advisory Committee for the University of the Tennessee Center for Environmental Biotechnology, Editorial Board for Ecotoxicology, Society for Industrial Microbiology; Society for Applied Microbiology (UK), Remediation Technology Development Forum, Chlorinated Solvents Working Group, Working Group for DOE OHER NABIR Program Plan; Invited Participant at: EPA Workshop “Development of Ecological Tier Testing Schemes for Microbial Biotechnology Applications; NABIR Basic Workshop, June 1999. Invited Participant at EPA Workshop Development and Application of Ecogenomics for Water Quality Assessment, May 2002.

GRANTS, PATENTS, AWARDS,

Recipient of: > 30 Grants from DOE and DOD for microbial ecology, biodegradation, bioremediation, and marine biotechnology. Most Recent:

1. Biogeochemical and Molecular Mechanisms Controlling Contaminant Transformation in the Environment. L. Liang, A. V. Palumbo, S. C. Brooks, B. Gu. DOE ERSP program
2. Geochemical, Genetic, and Community Controls on Mercury Methylation, , A. Palumbo, J. Wall, D. Elias, S. Brown, C. Brandt, Dr. F. Michael Saunders. DOE ERSP program
3. Role of microbial synergies in immobilization of metals. DOE, S. S. Epstein, K. Lewis, Y. Yang, M. Martin, A.V. Palumbo. DOE
4. An Integrated Experimental and Modeling Approach for the Study of Microbial Biofilm Communities, A. Palumbo, C. Brandt. ORNL
5. Enhancing Carbon Sequestration and Reclamation of Degraded Lands with Fossil-Fuel Combustion Byproducts, A. Palumbo, et. al.; DOE, Fossil Energy Program
6. Microbially induced P bioavailability: Effects on community ecology and U sequestration - A. Palumbo, P. Sobecky, and C. Zhang; DOE NABIR program
7. Non-competitive microbial diversity patterns in soils: Their causes and implications for bioremediation . J. Tiedje, J. Zhou, A. Palumbo, R. O’Neil. DOE, NABIR program
8. Linking process and population studies to understand the nitrogen loss mechanisms of Pacific Northwest marine sediments - J. Tiedje, J. Zhou, A. Devol, A. Massol-Deya, A. V. Palumbo; DOE, Marine Biotechnology Program.

Patent No. 5,807,697. Strong-Gunderson, J. M. and A. V. Palumbo. Biological Tracer Method.

Patent No. 629,146. Cochran, J., T. J. Phelps, J. M. McCarthy, and A. V. Palumbo. Position sensitive radioactivity detector for gas and liquid chromatography.

Patent No. 7,569,737. T. J. Phelps, C. Tsouris, A. V Palumbo, D. E. Riestenberg, and S. D. McCallum. Method for excluding salt and other soluble materials from produced water.

2002 Certificate of Appreciation, U.S. Department of Energy, Subsurface Contamination Focus Area.

2001 Merit Award from the Society for Technical Communication for Online Communications.

1998 Two Technical Communication Awards from the Society for Technical Communication.

1996 Annual Scientific Achievement Award, Environmental Sciences Division, ORNL.

Selected for Leadership ORNL, completed 2/98.

Two 1995 Royalty-Sharing Awards from Lockheed Martin Energy Systems.

Publications (Total = 135)

Hauser, L. J., M. L. Land, S. D. Brown, F. Larimer, K. L. Keller, B. J. Rapp-Giles, M. N. Price, M. Lin, D. C. Bruce, J. C. Detter, R. Tapia, C. S. Han, L. A. Goodwin, J.-F. Cheng, S. Pitluck, A. Copeland, S. Lucas, M. Nolan, A. L. Lapidus, A. V. Palumbo, and J. D. Wall. In press. The complete genome sequence and updated annotation of *Desulfovibrio alaskensis* G20. *Journal of Bacteriology*.

Brown, Steven D., J. D. Wall, A. M. Kucken, C. C. Gilmour, M. Podar, C. C. Brandt, H. Teshima, C. S. Han, J. C. Detter, M. L. Land, S. Lucas, J. Han, L. Pennacchio, M. Nolan, S. Pitluck, T. Woyke, L. A. Goodwin, A. V. Palumbo, and D. A. Elias. In press. Genome sequence of mercury-methylating and pleomorphic *Desulfovibrio africanus* strain Walvis Bay. *Journal of Bacteriology*.

Gilmour, C. C., D. A. Elias, A. M. Kucken, S. D. Brown, A. V. Palumbo, C. S. Schadt, and J. D. Wall. 2011. The sulfate-reducing bacterium *Desulfovibrio desulfuricans* ND132 as a model for understanding bacterial mercury methylation. *Appl. Environ. Microbiol.* 77:3938-3951.

Brown, Steven D., C. C. Gilmour, A. M. Kucken, J. D. Wall, D. A. Elias, C. C. Brandt, M. Podar, O. Chertkov, B. Held, D. C. Bruce, J. C. Detter, R. Tapia, C. S. Han, L. A. Goodwin, J-F Chen, S. Pitluck, T. Woyke, N. Mikhailova, N. N. Ivanova, J. Han, S. Lucas, A. L. Lapidus, M. L. Land, L. J. Hauser, A. V. Palumbo. 2011. Genome sequence of mercury-methylating *Desulfovibrio desulfuricans* ND132. *Journal of Bacteriology* 193:2078-2079.

Vishnivetskaya, T. A., J. J. Mosher, A. V. Palumbo, M. Podar, S. D. Brown, S. C. Brooks, Z. K. Yang, B. Gu, G. Southworth, M. M. Drake, C. C. Gilmour, J. D. Wall, C. C. Brandt and D. A. Elias. 2011. Mercury and other heavy metals influence bacterial community structure in contaminated Tennessee streams. *Appl. Environ. Microbiol.* 77:302-311.

Bollmann, A., A. V. Palumbo, K. Lewis, and S. Epstein. 2010. Isolation and physiology of bacteria from contaminated subsurface sediments. *Appl. Environ. Microbiol.* 76:7413-7419.

Elkins, J. G., A. Lochner, S. D. Hamilton-Brehm, K. W. Davenport, M. Podar, S. D. Brown, M. L. Land, L. J. Hauser, D. M. Klingeman, B. Raman, L. A. Goodwin, R. Tapia, L. J. Meincke, J. C. Detter, D.C. Bruce, C. S. Han, A. V. Palumbo, R. W. Cottingham, M. Keller, and D. E. Graham. 2010. Complete genome sequence of the cellulolytic thermophile *Caldicellulosiruptor obsidiansis* OB7. *Journal of Bacteriology*. 192:6099-6100.

Hollister, E. B., C. W. Schadt, A. V. Palumbo, R. J. Ansley, and T. W. Boutton. 2010. Structural and functional diversity of soil bacterial and fungal communities following woody plant encroachment in the southern Great Plains. *Soil Biology and Biochemistry*. 42:1816-1824.

Porat, I., Tatiana A. Vishnivetskaya, Jennifer J. Mosher, Craig C. Brandt, Zamin K. Yang, Scott C. Brooks, Liyuan, Liang, Meghan. M. Drake, Mircea Podar, Steven D. Brown, and Anthony V. Palumbo. 2010. Characterization of the Archaeal community in contaminated and uncontaminated surface stream sediments. *Microbial Ecology*. 60: 784-795. doi: 10.1007/s00248-010-9734-2

Vishnivetskaya, T. A., C. C. Brand, A. Madden, M. M. Drake, J. Kostka, D. M. Akob, K. Kusel, and A. V. Palumbo. 2010. Microbial community changes in response to ethanol or methanol amendments for U(VI) reduction. doi:10.1128/AEM.00308-1. *Appl. Environ. Microbiol.* 76:5728–5735.

Miller, L. D., J. J. Mosher, A. Venkateswaran, Z. K. Yang, A. V. Palumbo, T. J. Phelps, M. Podar, C. W. Schadt, and M. Keller. 2010. Establishment and metabolic analysis of a model microbial community for understanding trophic and electron accepting interactions of subsurface anaerobic environments. *BMC Microbiology*. 10:149; doi:10.1186/1471-2180-10-149. <http://www.biomedcentral.com/1471-2180/10/149>

Green, S. J., O. Prakash, T. M. Gihring, D. M. Akob, P. Jasrotia, P. M. Jardine, D. B. Watson, S. D. Brown, A. V. Palumbo, and J. E. Kostka. 2010. Denitrifying bacteria isolated from terrestrial subsurface sediments exposed to mixed waste contamination. *Appl. Environ. Microbiol.* 76:244-3254.

Chung, E., H. Kweon, S. Yiacoumi, I. Lee, D. C. Joy, A. V. Palumbo, and C. Tsouris. 2010. Adhesion of spores of *Bacillus thuringiensis* on a planar surface. *Environ. Sci. and Tech.* 44: 290-296.

Waldron, P., L. Wu, J. Van Nostrand, C. Schadt, D. Watson, P. Jardine, A. V. Palumbo, T. Hazen, and J. Zhou. 2009. Functional gene array-based analysis of microbial community structure in groundwaters with a gradient of contaminant levels. *Environ. Sci. and Tech.* 43:3529-3534.

Taboada-Serrano, P., S. Ulrich, P. Szymcek, S. D. McCallum, T. J. Phelps, A. Palumbo, and C. Tsouris. 2009. Multiphase, microdispersion reactor for the continuous production of methane gas hydrate. *Ind. Eng. Chem. Res.* 48:6448-6452.

Yang, Y., D. P. Harris, F. Luo, W. Xiong, M. Joachimiak, L. Wu, P. Dehal, J. Jacobsen, Z. Yang, A. V. Palumbo, A. P. Arkin and J. Zhou 2009. Snapshot of iron response in *Shewanella oneidensis* by gene network reconstruction. *BMC Genomics* 2009, 10:131

Palumbo, A.V., I. Porat, J. R. Phillips, J. E. Amonette, M. M. Drake, S. D. Brown and C. W. Schadt. 2009. Leaching of mixtures of biochar and fly ash. In *Proceedings of 2009 World of Coal Ash (WOCA)*, May 7-10, 2009. Covington, Kentucky, USA (On CD ROM).

Yang, S., T. J. Tschaplinski, N. L. Engle, S. L. Carroll, S. L. Martin, B. H. Davison, A. V. Palumbo, M. Rodriguez Jr and S. D. Brown. 2009. Transcriptomic and metabolomic profiling of *Zymomonas mobilis* during aerobic and anaerobic fermentations. *BMC Genomics* 2009, 10:34.

Madden, A. S., A.V. Palumbo, B. Ravel, T. A. Vishnivetskaya, T. J. Phelps, C. S. Schadt, and C. C. Brandt. 2009. Donor-dependent extent of uranium reduction for bioremediation of contaminated sediment microcosms. *Journal of Environmental Quality*. 38:53-60.

Kalyanaraman, M., S. T. Retterer, T. E. McKnight, M. N. Ericson, S. L. Allman, J. G. Elkins, A. V. Palumbo, M. Keller and M. J. Doktycz. 2009. Controlled microfluidic production of alginate beads for in situ encapsulation of microbes. Pages 100 -103 in the proceedings of the First Annual ORNL Biomedical Science and Engineering Conference. "Exploring the Intersections of Interdisciplinary Biomedical Research" Oak Ridge, Tennessee, March 18-19, 2009.

Phelps T. J., A. V. Palumbo, B. L. Bischoff, C. J. Miller, L.A. Fagan, M.S. McNeilly, and R. R. Judkins. 2008. Micron-pore-sized metallic filter tube membranes for filtration of particulates and water purification. *Journal of Microbiological Methods*. 74:10-16.

Akob, D.M., H. J. Mills, T. M. Gihring, L. Kerkhof, J. W. Stucki, A. S. Anastácio, K-J. Chin, K. Küsel, A. V. Palumbo, D. B. Watson, and Joel E. Kostka. 2008. Functional diversity and electron donor dependence of microbial populations capable of U(VI) reduction in radionuclide contaminated subsurface sediments. *Appl. Environ. Microbiol.* 74:3159-3170.

Palumbo, A.V., J. C. Schryver, S. M. Pfiffner, T. Marsh, and C. C. Brand. 2008. Relating microbial community structure to a dominant environmental variable in a complex environment; An example from a chromium contaminated site. pp. 61-67. In *Proceedings of The 2008 International Conference on Bioinformatics and Computational Biology (Biocomp 2008) Volume I*, Editors; H. R. Arabnia, M. Q. Yang, and J. Y. Yang. Las Vegas, July 14-17, 2008. CSREA Press, U.S.A.

Parker, J. and A. Palumbo. Remediation of groundwater contaminated by nuclear waste. 2008. A workshop on accelerating development of practical field-scale bioremediation models: An online Meeting, 23 January to 20 February 2008. *EOS* 89:271.

Keller, M., C. W. Schadt, A. V. Palumbo. 2008. Single-Cell Genomics. In: *Assessing Uncultivated Microorganisms from the Environment to Organisms and Genomes and Back*. Ed. K. Zengler. ASM Press, Washington, DC.

Yang, Y., D. P. Harris, F. Luo, L. Wu, A. B. Parsons, A. V. Palumbo, and J. Zhou. 2008. Physiological and transcriptomic analyses to characterize the function of Fur and iron response in *Shewanella oneidensis*. *BMC Genomics* 2008, 9 (Suppl 1):S11 doi:10.1186/1471-2164-9-S1-S11.

Martin, M. Z., S. D. Wullschleger, C. T. Garten Jr., and A.V. Palumbo. 2007. Measurement of carbon for carbon sequestration and site monitoring, In "Laser-induced Breakdown Spectroscopy," pp 341-351 (Chapter 15), Eds. Jagdish P. Singh and Surya N. Thakur, Elsevier Publishers.

Palumbo, A. V., J. C. Tarver, L. A. Fagan, M. S. McNeilly, R. Ruther, L. S. Fisher, J. E. Amonette. 2007. Comparing metal leaching and toxicity from high ph, low ph, and high ammonia fly ash. *Fuel*. 86 (10-11): 1623-1630. (DOI: 10.1016/j.fuel.2006.11.018).

Palumbo, A. V., J. E. Amonette J. R. Tarver, L. A. Fagan, M. S. McNeilly, W. Lee Daniels. 2007. Fly ash characteristics and carbon sequestration potential. Paper No. 115 on CD ROM, In *Proceedings of 2007 World of Coal Ash (WOCA)*, May 7-10, 2007. Covington, Kentucky, USA

Schryver, J.C., C. C. Brandt, S. M. Pfiffner, A. V. Palumbo, J. S. Almeida, A. D. Peacock, D.C. White, J. P. McKinley, and P.E. Long. 2006. Application of nonlinear analysis methods for identifying relationships between microbial community structure and groundwater geochemistry. *Microbial Ecology* 51 (2): 177-188.

Fields, M. W., J. Schryver, C. C. Brandt, T. Yan, J. Zhou, and A. Palumbo. 2006. Confidence intervals for similarity values achieved from direct sequence determination of cloned 16S rRNA genes from environmental samples. *Journal of Microbiological Methods* 65: 144-152.

Palumbo, A. V., S. M. Pfiffner, L. Fagan, M. McNeilly, S. Rishell, J. E. Kostka, and C. C. Brandt. 2005. Substrate and community structure determinants of uranium reduction rates in subsurface sediments. In: N. Kalogerakis (Ed.), *Proceedings of the Third European Bioremediation Conference (Chania, Greece, July 2005)*, (on CD).

Stapleton, R. D. Jr., Z. L. Sabree, A. V. Palumbo, C. Moyer, A. Devol, Y. Roh, and J-Z. Zhou. 2005. Metal reduction at cold temperatures by *Shewanella* isolates from various marine environments. *Aquatic Microbial Ecology* 38: 81-91.

Palumbo, A. V., J. R. Tarver, L. Fagan, R. Ruther, and J. E. Amonette. 2005. Potential for metal leaching and toxicity from fly ash applied for increasing carbon sequestration in soil. *Proceedings of the World of Coal Ash 2005 Meeting*. April 11-15, 2005. Lexington, KY.

Palumbo, A.V., J. C. Schryver, M. W. Fields, C. E Bagwell, J-Z. Zhou, T. Yan, X. Liu, and C. C. Brandt. 2004. Coupling of functional gene diversity and geochemical data from environmental samples using ANN. *Appl. Environ. Microbiol.* 70: 6525-6534.

Palumbo, A. V., S. Fisher, M. Martin, Z. Yang, J. Tarver, S. D. Wulfschleger. 2004. Application of emerging tools and techniques for measuring carbon and microbial communities in reclaimed mine soils. *Environmental Management*. Vol 33, Supplement 1, pp S518-S527.

Pfiffner, S. M., A. V. Palumbo, and G. Sayles. 2004. Microbial population and degradation activities changes monitored during chlorinated solvent biovent demonstration. *Ground Water Monitoring and Remediation*. 24: 102-110.

Martin, M. Z., S. D. Wulfschleger, C. T. Garten, A. V. Palumbo, and J. G. Smith. 2004. Elemental analysis of environmental and biological samples using laser-induced breakdown spectroscopy and pulsed Raman spectroscopy. *Journal of Dispersion Science and Technology* 25:687-694.

Palumbo, A. V., W. Lee Daniels, J. A. Burger, J. F. McCarthy, Stan Wulfschleger, J. E. Amonette, L. S. Fisher. 2004. Prospects for enhancing carbon sequestration and reclamation of degraded lands with fossil-fuel combustion byproducts. *Adv. Envir. Res.* 8:425-438.

Zhou, J. Z., B.-C. Xia, H. Huang A. V. Palumbo, and J. M. Tiedje. 2004. Microbial diversity and heterogeneity in oligotrophic, sandy subsurface soils. *Appl. Environ. Microbiol* 70:1723-1734.

Zhou, J. Z., B. C. Xia, H. S. Huang, D. S. Treves, L. J. Hauser, R. J. Mural, A. V. Palumbo, and J. M. Tiedje. 2003. Bacterial phylogenetic diversity and a novel candidate division of two humid region, sandy surface soils. *Soil Biology and Biochemistry*. 35: 915-924.

Liu, X., S. M. Tiquia, G. Holguin, L.Wu, S.C. Nold, A.H. Devol, K. Lou, A.V. Palumbo, J. M. Tiedje, and J-Z. Zhou. 2003. Molecular diversity of denitrifying genes in continental margin sediments within the oxygen deficient zone of the Pacific Coast of Mexico. *Appl. Environ. Microbiol.* 69:3549-3560.

Martin, M. Z., S. D. Wullschleger, C. T. Garten, and A. V. Palumbo. 2003. Laser-induced breakdown spectroscopy for the environmental determination of total carbon and nitrogen in soils. *Appl. Optics*. 42:2072-2077.

Palumbo, A. V., L.S. Fisher, J.R. Tarver, W.L. Daniels, Z. Yang, S.M. Tiquia, L. Wu, J. Zhou, J. Amonette. 2003. Microbial communities, carbon and nitrogen in mine soils reclaimed with fly ash and biosolids amendments (Issues with the Use of Fly Ash for Carbon Sequestration). In: Proceedings of the 2nd Annual Conference on Carbon Sequestration. May 5-8, 2003. Alexandria, Va. http://www.carbonsq.com/proc.cfm?paper_id=5E

Amonette, J. E., J. Kim, C. K. Russell, A. V. Palumbo, W. L. Daniels. 2003. Fly ash amendments catalyze soil carbon sequestration. In: Proceedings of the Second Annual Conference on Carbon Sequestration. May 5-8, 2003. Alexandria, Va. http://www.carbonsq.com/poster_list.cfm?poster_id=T.

Powers, L.G., H. J. Mills, A. V. Palumbo, C. Zhang, K. Delaney, and P. A. Sobecky. 2002. Introduction of a plasmid-encoded *phoA* gene for constitutive overproduction of alkaline phosphatase in three subsurface *Pseudomonas* isolates. *FEMS Microbiol Ecol* 41:115-123.

Palumbo, A. V., J. Z. Zhou, C. Zhang, R. D. Stapleton, B. L. Kinsall, and T. J. Phelps. 2002. Biotransformations and biodegradation in extreme environments. In *Bioremediation Technology for Health and Environmental Protection*. Eds. V. P. Singh and R. D. Stapleton. Progress in Industrial Microbiology, Vol 36, 636 pp. Elsevier, Amsterdam.

Pfiffner, S. M., P. A. Sobecky, T. J. Phelps, and A. V. Palumbo. 2002. Microbiology of Atlantic Coastal plain aquifers and other unconsolidated subsurface sediments. In Gabriel Bitton (Ed.) *Encyclopedia of Microbiology Volume 4*, pp. 2028-2042. John Wiley & Sons, Inc. New York, NY.

Phelps, T. J., A. V. Palumbo, A. Baleive. 2002. Metabolomics and microarrays for improved understanding of phenotypic characteristics controlled by both genomics and environmental constraints. *Current Opinion in Biotech.* 13:20-24.

Pfiffner, S. M., A. V. Palumbo, and G. Sayles. 2002. Microbial population and degradation activities changes monitored during chlorinated solvent biovent demonstration. In: Proceedings Spectrum 2002: International Conference on Nuclear and Hazardous Waste Management. Reno, Nevada, August 4-8, 2002. CD-ROM at <http://store.ans.org/index.cgi?c=prcd>.

Zhou, J.-Z., B.C. Xia, D. S. Treves, L.-Y. Wu, T. L. Marsh, R. V. O'Neill, A. V. Palumbo and J. M. Tiedje. 2002. Spatial and resource factors as causes for high soil microbial diversity. *Appl. Environ. Microbiol.* 68: 326-334.

Hurt, R. A., X. Qiu, L. Wu, Y. Roh, A. V. Palumbo, J. M. Tiedje, and J. Zhou. 2001. Simultaneous recovery of RNA and DNA from soils and sediments. *Appl. and Environ. Micro.* 67: 4495-4503.

Pfiffner, S.M., A.V. Palumbo, B.L. Kinsall, A.D. Peacock, and T. J. Phelps. 2001. Microbial Heterogeneity Implications for Bioremediation. Proceedings of In Situ and On-site Bioremediation. The Sixth International Conference. June 4-7, 2001. San Diego Ca. Battle Press. Columbus.

Sobecky, P., A.V. Palumbo, C.L. Zhang, and L.G. Powers. 2001. Over production of bacterial alkaline phosphatase for uranium immobilization and sequestration. *In* Proceedings of In Situ and On-site Bioremediation. The Sixth International Conference. June 4-7, 2001. San Diego Ca. Battelle Press. Columbus.

Zhou, J., S. Liu, B. Xia, C. Zhang, A. V. Palumbo, and T. J. Phelps. 2001. Molecular characterization of thermophilic iron-reducing enrichment cultures from deep subsurface environments. *J. Applied. Micro.* 90: 96-105.

Qiu, X., L. Wu, H. Huang, P. E. McDonel, A. V. Palumbo, J. M. Tiedje, J. Zhou. 2001. Evaluation of PCR-generated chimeras, mutations, and heteroduplex with 16S ribosomal RNA gene-based cloning. *Appl. and Environ. Micro.* 67:880-887.

Zhou J. and A. V. Palumbo. 2000. Sequence to function: The 7th Conference on Small Genomes. *Genetica.* 108:VII-IX.

Cox, C.D., D. E. Nivens, S. Ripp, M. Wong, A. Palumbo, R. S. Burlage, G. S. Sayler. 2000. An intermediate-scale lysimeter facility for subsurface bioremediation research. *Bioremediation J.* 4:69-79.

Kinsall, B. L., G. V. Wilson, and A. V. Palumbo. 2000. The effect of soil heterogeneity on the vadose zone transport of bacteria for bioaugmentation. pp. C2-4:395-400. In G. B. Wickramanayake, A. R. Gavaskar, B. C. Alleman, V. S. Magar, [eds.]. *Bioremediation and Phytoremediation of Chlorinated and Recalcitrant Compounds. Proceedings of the 2nd International Conference on Remediation of Chlorinated and Recalcitrant Compounds, May 22-25, 2000, Monterey, California.* Battelle Press, Columbus.

Pfiffner, S. M, T. J. Phelps, and A. V. Palumbo. 2000. Bioaugmentation potential at a carbon tetrachloride contaminated site. pp. C2-4:389-394. In G. B. Wickramanayake, A. R. Gavaskar, B. C. Alleman, V. S. Magar, [eds.]. *Bioremediation and Phytoremediation of Chlorinated and Recalcitrant Compounds. Proceedings of the 2nd International Conference on Remediation of Chlorinated and Recalcitrant Compounds, May 22-25, 2000, Monterey, California.* Battelle Press, Columbus.

Zhou, J.-Z., B.-C. Xia, L.-Y. Wu, R. V. O'Neill, A. V. Palumbo, and J. M. Tiedje. 2000. Unusual diversity in soil microbial communities. *The 6th Chinese Society of Ecology.* P.29-40.

Zhang, C., R. D. Stapleton, J. Zhou, A. V. Palumbo, and T. J. Phelps. 1999. Iron Reduction by Psychrotrophic Enrichment Cultures. *FEMS Microbial Ecology* 30:367-371.

Zhou, J., A. V. Palumbo, and J. Strong-Gunderson. 1999. Phylogenetic characterization of a mixed microbial community capable of degrading carbon tetrachloride. *Appl. Biochem. and Biotech.* 80:243-253.

Palumbo, A. V., J-Z. Zhou, T. J. Phelps, B. Kinsall, C. Zhang, E. L. Majer, J. E. Peterson, T. Griffin S. M. Pfiffner. 1999. Ecology and bioremediation: a staged approach to site characterization. pp. 195-204. *In* G. A. Uzochukwu and G. B. Reddy. [eds.]. *Proceedings of the 1998 National Conference on Environmental Remediation Science and Technology.* Battelle Press, Columbus.

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