Cumulative Bio-Bibliography
Princeton University
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Bess B. Ward

William J. Sinclair Professor of Geosciences
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POSITIONS HELD

2007-2011	Visiting Scientist, Plymouth Marine Laboratory Plymouth UK, July – August
2010-Present	Trustee, Plymouth Marine Laboratory
2006-Present	Chair, Department of Geosciences Princeton University
1998-Present	Professor, Department of Geosciences, Princeton University
2004	Visiting Scientist, Plymouth Marine Laboratory Plymouth UK, January - August
1995-1998	Chair, Ocean Sciences Department University of California, Santa Cruz
1995-1998	Professor, Ocean Sciences Department University of California, Santa Cruz
1991-1995	Associate Professor, Marine Sciences Department University of California, Santa Cruz
1993	Visiting Scientist, Max Planck Institute für Limnologie Plön, Germany, October-December
1989-1991	Assistant Professor of Marine Sciences University of California, Santa Cruz
1984-1989	Assistant Research Oceanographer, Institute of Marine Resources, Scripps Institution of Oceanography, University of California, San Diego
1987-1991	Associate Member, Center for Molecular Genetics, University of California, San Diego
1987-1988	Chairperson, Food Chain Research Group, Scripps Institution of Oceanography, University of California, San Diego
1982-1984	Postgraduate Research Biologist, Institute of Marine Resources, Scripps Institution of Oceanography, University of California, San Diego
1976-1982	Graduate Research Assistant, Department of Oceanography, University of Washington, Seattle
1980 (Summer)	Graduate Teaching Assistant, Friday Harbor Laboratories, Department of Oceanography, University of Washington
1977 (Fall)	Graduate Teaching Assistant, Department of Oceanography, University of Washington

EDUCATION

1982	Ph.D., Biological Oceanography, University of Washington, Seattle, WA
1979	M.S., Biological Oceanography, University of Washington, Seattle, WA
1978	Microbial Ecology Course, Marine Biological Laboratory, Woods Hole, MA
1976	B.S., Zoology, Michigan State University, East Lansing, MI
1971-72	Mathematics, Auburn University, Auburn, AL

HONORS and AWARDS:

Distinguished Visiting Biologist, Woods Hole Oceanographic Institution, March 1996
G. Evelyn Hutchinson Medal, American Society of Limnology and Oceanography, 1997
Who's Who in American University Teachers, 1997
Fellow of the American Academy of Microbiology, 1999
Fellow of the American Geophysical Union, 2002
Fellow of the American Academy of Arts and Sciences, 2004
Proctor and Gamble Award in Applied and Environmental Microbiology, American Society for Microbiology, 2012

RESEARCH INTERESTS:

Marine and global nitrogen cycle, molecular and immunological probes to link marine bacteria/ archaea and microbial processes (especially nitrification and denitrification), N utilization by phytoplankton, microbial genomics

PUBLICATIONS

Bouskill, N. J., D. Eveillard, D. M. Chien, A. Jayakumar, and B. B. Ward, Distribution and abundance of ammonia-oxidizing organisms across environmental gradients. *Environmental Microbiology* DOI: 10.1111/j.1462-2920.2011.02623.x (2011)

Fawcett, S. E., M. W. Lomas, J. R. Casey, B. B. Ward and D. M. Sigman. submitted. Eukaryotes dominate new production in the Sargasso Sea. *Nature Geosciences,* 4: 717-722 (2011)

Bhadury, P. and Ward, B. B. Intron features of key functional genes mediating nitrogen metabolism in marine phytoplankton. *Marine Genomics,* 3: 207-213 (2011)

Ward, B. B., Rees, A. P., Somerfield, P. J., and Joint, I. R. Linking phytoplankton community composition to seasonal changes in f ratio. *ISME Journal,* 5: 1759-1770 doi:10.1038/ismej.2011.50 (2011)

Bowen, J. L., B. B. Ward, H. G. Morrison, J. E. Hobbie, I. Valiela, L. A. Deegan, and M. L. Sogin. Microbial community composition in sediments resists perturbation by nutrient enrichment. *ISME Journal,* 5: 1540-1548 doi:10.1038/ismej.2011.22 (2011)

Fawcett, S. E., and Ward, B. B. Phytoplankton succession and nitrogen utilization during the development of a simulated upwelling bloom. *Marine Ecology Progress Series*, 436: 13-31 (2011)

Ward, B. B. Nitrification in the Ocean. In: B. B. Ward, M. G. Klotz and D. A. Arp, Editors. Nitrification, ASM Press, Washington, D.C. Pp. 325-345 (2011)

Ward, B. B. Measurement and distribution of nitrification rates in the oceans. In Microbial Nitrification and Related Processes. M. G. Klotz, editor, *Methods in Enzymology,* 486, 307-323 (2011)

Ward, B. B. and N. J. Bouskill. The utility of functional gene arrays for assessing community composition, relative abundance and distribution of ammonia-oxidizing bacteria and archaea. In Microbial Nitrification and Related Processes. M. G. Klotz, editor. *Methods in Enzymology*, 496: 373-396 (2011)

Campbell, M., Chain, P., Dang, H., El Sheik, A., Norton, J., Ward, N., Ward, B. B., Klotz, M. G. *Nitrosococcus watsonii sp. nov.,* a new species of marine obligate ammonia-oxidizing bacteria that is not omnipresent in the world's oceans. *FEMS Microbiology Ecology,* 76: 39-48 (2011)

Bouskill, N. J., Eveillard, D., O'Mullan, G. D., Jackson, G. A., and Ward, B. B. Seasonal and annual reoccurrence in Ammonia-oxidizing bacterial population structure. *Environmental Microbiology* 13: 872-886 (2011)

Malcolm, E. G., J. K. Schaefer, E. B. Ekstrom, C. B. Tuit, A. Jayakumar, H. Park, B. B. Ward and F. M. M. Morel. Mercury methylation in oxygen deficient zones of the oceans: No evidence for the predominance of anaerobes. *Marine Chemistry*, 122: 11-19. (2010)

Bulow, S.E., Rich, J.J., Naik, H, Pratihary, A. and Ward, B.B. Denitrification and not anammox is dominant in the Arabian Sea Oxygen Minimum Zone. *Deep-Sea Res*. Pt 1, 57: 384-393 (2010)

Bhadury, P. and B. B. Ward. Molecular diversity of marine phytoplankton communities based on key functional genes. *Journal of Phycology* 45: 1335-1347 (2009)

Jayakumar, A. O'Mullan, G, Naqvi, S.W.A and Ward B.B. Distribution and Relative Quantification of key Genes Involved in Fixed Nitrogen Loss From the Arabian Sea Oxygen Minimum Zone. In, *Indian Ocean Biogeochemical Processes and Ecological Variability* eds., Wiggert J.D., Hood R.R., Naqvi, S.W.A., Brink, K.H., and Smith, S.L. American Geophysical Union, pp 187-203 (2009)

Ward, B.B., Devol, A.H., Rich, J.J., Chang, B.X., Bulow, S.E., Naik, H, Pratihary, A. and Jayakumar A. Denitrification as the dominant nitrogen loss process in the Arabian Sea. *Nature* 461: 78-82 (2009)

Jayakumar, A. O'Mullan, G, Naqvi, S.W.A and Ward B.B. Denitrifying bacterial community composition changes associated with stages of denitrification in oxygen minimum zones *Microb. Ecol*. 58, 350-362 (2009)

Song, B. K., E. Chyun, P. Jaffe and B. B. Ward. Molecular methods to detect and monitor of uncultured dissimilatory arsenate respiring bacteria (DARB) in sediments. *FEMS Microbial Ecology,* 68: 108-117 (2009)

Ward, B.B., C.B Tuit, A. Jayakumar, J.J. Rich, J. Moffett and W. Naqvi. Organic carbon, and not copper, controls denitrification in oxygen minimum zones of the ocean. *Deep Sea Research I* 55: 1672-1683 (2008)

Ward, B. B. Phytoplankton community composition and gene expression of functional genes involved in carbon and nitrogen assimilation. *Journal of Phycology* 44: 1490-1503 (2008)

Ward, B. B. Nitrification. In: Nitrogen in the Marine Environment. Eds. D. G. Capone, D. A. Bronk, M. R. Mulholland, and E. J. Carpenter. Elsevier, Amsterdam. Pp. 199 – 262 (2008)

Bulow, S. E., Francis, C. A., Jackson, G. A. and Ward, B. B. Sediment denitrifier community

composition and *nirS* gene expression investigated with functional gene microarrays. *Environmental Microbiology* 10: 3057-3069 (2008)

Starkenburg, S. R., Larimer, F. W., Stein, L. Y., Klotz, M. G., Chain, P. S., Sayavedra-Soto, L.A., Poret-Peterson, A. T., Gentry, M. E., Arp, D. J., Ward, B. B., Bottomley, P. J. Complete genome sequence of *Nitrobacter hamburgensis* X14 and comparative genomic analysis of species within the genus *Nitrobacter Appl Environ Microbiol* **74**: 2852-2863. (2008)

Ward, B. B. Nitrification. In: Encyclopedia of Ecology. Eds. S. E. Jorgensen and B. D. Faith, Ecological Processes. Vol 3 of Encyclopedia of Ecology, 5 vols. Elsevier, Oxford. Pp. 2511-2518 (2008)

Duce, R.A., J. LaRoche, K. Altieri, K. Arrigo, A. Baker, D.G. Capone, S. Cornell, F. Dentener, J. Galloway, R.S. Ganeshram, R.Geider, T. Jickells, M.M. Kuypers, R. Langlois, P. S. Liss, S. M. Liu, J.J. Middelburg, C.M. Moore, S. Nickovic, A. Oschlies, T. Pedersen, J. Prospero, R. Schlitzer, S. Seitzinger, L.L. Sorensen, M. Uematsu, O. Ulloa, M. Voss, B. Ward, and L. Zamora, Impacts of Atmospheric Anthropogenic Nitrogen on the Open Ocean. *Science,* 320:893-898 (2008)

Rich, J. J., O. R. Dale, B. K. Song and B. B. Ward. Anaerobic ammonium oxidation (anammox) in Chesapeake Bay sediments. *Microbial Ecology,* 55: 311-320 (2008)

Ward, B. B. Nitrogen cycling in aquatic environments. In: Manual of Environmental Microbiology. Eds. C. J. Hurst, R. L. Crawford, J. L. Garland, D. A. Lipson, A. L. Mills, L. D. Stetzenbach. American Society for Microbiology, New York. pp 511-522 (2007)

Adhitya, A., F. I. M. Thomas and B. B. Ward. Diversity of assimilatory nitrate reductase genes from plankton and epiphytes associated with a seagrass bed. *Microbial Ecology,* 54: 587-597 (2007)

Ward, B. B., D. Eveillard, J. D. Kirshtein, J. D. Nelson, M. A. Voytek and G. A. Jackson. Ammonia-oxidizing bacterial community composition in estuarine and oceanic environments assessed using a functional gene microarray. *Environmental Microbiology* 9: 2522-2538 (2007)

Song, B. K. and B. B. Ward. Molecular cloning and characterization of high affinity nitrate transporters in marine phytoplankton. *Journal of Phycology* 43:542-552 (2007)

Moisander, P. H., A. E. Morrison, B. B. Ward, B. D. Jenkins, J. P. Zehr. Spatial-temporal variability in diazotroph assemblages in Chesapeake Bay using an oligonucleotide *nifH* microarray. *Environmental Microbiology*, 9:1823-1835 (2007)

Taroncher-Oldenburg, G. and Ward, B.B. Oligonucletoide microarrays for the study of microbial communities. In: DNA Analysis by Nonradioactive Probes (Ed.) Hilario, E. and Mackay, J.F., Humana Press, Totowa, NY, USA pp 301-315 (2006)

Klotz, M. G., D. J. Arp, P. S. G. Chain, A. R. El-Sheikh, L. J. Hauser, N. G. Hommes, F. W. Larimer, S. A. Malfatti, J. M. Norton, A. T. Poret-Peterson, L. M. Vergez and B. B. Ward. Complete genome sequence of the marine, chemolithoautotrophic ammonia-oxidizing bacterium *Nitrosococcus oceani* ATCC 19707. Applied and Environmental Microbiology, 72: 6299-6315 (2006)

Glatz, R. E., P. W. Lepp, B. B. Ward and C. A. Francis. Microbial diversity in the water column of permanently ice-covered Lake Bonney, Antarctica. *Geobiology*, 4: 53-67 (2006)

Bronk, D. A. and B. B. Ward. Inorganic and organic nitrogen cycling in the Southern California Bight. (*Deep-Sea Research*, 52: 2285-2300 (2005)

Ward, B. B. and G. D. O'Mullan. Community level analysis: Genetic and biogeochemcial approaches to investigate community composition and function in aerobic ammonia oxidation. In: *Methods in Enzymology*, 397:395-413 (2005)

Ward, B. B. Temporal variability in nitrification rates and related biogeochemical factors in Monterey Bay, California. *Marine Ecology-Progress Series*, 292: 97-109 (2005)

Ward, B. B. Molecular approaches to marine microbial ecology and the marine nitrogen cycle. In: *Annual Review of Earth and Planetary Science*, 33:092203.122514 (2005)

Song, B., and B. B. Ward. Diversity of benzoyl-CoA reductase genes in aromatic compound degrading denitrifying bacteria and in environmental samples, *Applied and Environmental Microbiology*, 71: 2036-2045 (2005)

Ward, B. B., J. Granger, M. T. Maldonado, K. L. Casciotti, S. Harris and M. L. Wells. Denitrification in the hypolimnion of permanently ice-covered Lake Boney, Antarctica *Aquatic Microbial Ecology*, 52: 197-205 (2005)

Casciotti, K. L. and B. B. Ward. Nitric oxide reductase (*norB*) genes identified in ammonia-oxidizing bacteria, *FEMS Microbial Ecology*, 52: 197-205 (2005)

Allen, A. E., B. Song and B. B. Ward. Characterization of diatom (Bacillariophyceae) nitrate reductase genes and detection of eukaryotic nitrate reductase genes from marine waters. *Journal of Phycology*, 41: 95-104 (2005)

O'Mullan, G. D. and B. B. Ward. Comparison of temporal and spatial variability of ammonia-oxidizing bacteria to nitrification rates in Monterey Bay, CA. *Applied and Environmental Microbiology*, 71: 697-705 (2005)

Jiang, W., A. Saxena, B. Song, B. B. Ward, T. J. Beveridge, S. C. B. Myneni. Elucidation of functional groups on Gram-positive and Gram-negative bacterial surfaces using infrared spectroscopy, *Langmuir*, 20 11433-11442 (2004)

Song, B., and B. B. Ward. Molecular characterization of the assimilatory nitrate reductase gene and its expression in the marine green alga *Dunaliella tertiolecta*. *Journal of Phycology,* 40: 721-731 (2004)

Jenkins, B. D., G. F. Steward, S. M. Short, B. B. Ward and J. P. Zehr. Fingerprinting diazotroph communities in the Chesapeake Bay by using a DNA macroarray. *Applied and Environmental Microbiology*, 70: 1767-1776 (2004).

Steward, G. F., B. D. Jenkins, B. B. Ward and J. P. Zehr. Development and testing of a DNA macroarray to assess nitrogenase (*nifH*) gene diversity. *Applied and Environmental Microbiology*, 70: 1455-1465 (2004).

Jayakumar, D. A., C. A. Francis, S. W. A. Naqvi and B. B. Ward. Diversity of nitrite reductase genes in the denitrifying water column of the coastal Arabian Sea. *Aquatic Microbial Ecology*, 34: 69-78 (2004).

Francis, C. A., G. D. O'Mullan and B. B. Ward. Diversity of ammonia monooxygenase (*amoA*) genes across environmental gradients in Chesapeake Bay sediments. *Geobiology*, 1: 129-140 (2003)

Ward, B. B. Significance of anaerobic ammonium oxidation in the ocean. *Trends in Microbiology*, 11: 408-410 (2003)

Casciotti, K. L., D. M. Sigman and B. B. Ward. Linking diversity and biogeochemistry in ammonia-oxidizing bacteria *Geomicrobiology Journal,* 20: 335-353 (2003)

Taroncher-Oldenburg, G, E. Griner, C. A. Francis and B. B. Ward. Oligonucleotide microarray for the study of functional gene diversity of the nitrogen cycle in the environment, *Applied and Environmental Microbiology,* 69: 1159-1171 (2003)

Ward, B. B., J. Granger, M. T. Maldonado and M. L. Wells. What limits bacterial production in the suboxic region of permanently ice-covered Lake Bonney, Antarctica? *Aquatic Microbial Ecology,* 31: 33-47 (2003)

Caffrey, J. M., N. E. Harrington, I. P. Solem and B. B. Ward. Biogeochemical Processes in a Small California Estuary, Elkhorn Slough, CA.: 2. Nitrification Activity, Community Structure and Role in Nitrogen Budgets, *Marine Ecology Progress Series*, 248: 27-40 (2003)

Song, B. and B. B. Ward. Nitrite reductase genes in halobenzoate degrading denitrifyng bacteria and related species. *FEMS Microbial Ecology*, 34: 349-357 (2003)

Granger, J. and B. B. Ward. Accumulation of nitrogen oxides in copper-limited cultures of denitrifying bacteria. *Limnology and Oceanography*, 48: 313-318 (2003)

Ward, B. B. and G. D. O'Mullan. Worldwide distribution of marine ammonia-oxidizing Gamma-Proteobacteria detected in seawater by PCR and sequencing of 16S rRNA and *AmoA* genes, *Applied and Environmental Microbiology*, 68: 4153-4157 (2002)

Ward, B. B. How many species of prokaryotes are there? *Proceedings of the National Academy of Sciences, US*. 99:10234-10236 (2002)

Caffrey, J. M., N. E. Harrington and B. B. Ward. Biogeochemical Processes in a Small California Estuary: 1. Benthic Fluxes and Pore Water Constituents Reflect High Nutrient Freshwater Inputs, *Marine Ecology Progress Series*, 233: 39-53 (2002)

Ward, B. B. Nitrification in Aquatic Systems. Encyclopedia of Environmental Microbiology, D. A Capone, Ed., Wiley & Sons, New York, Pp. 2144-2167 (2002)

Zehr, J. P, and B. B. Ward. Nitrogen cycling in the ocean: new perspectives on processes and paradigms. *Applied and Environmental Microbiology*, 68: 1015-1024 (2002)

Ward, B. B. and D. A. Bronk. Net nitrogen uptake and DON release in surface waters: Size fraction experiments implicate grazing and community structure in DON release. *Marine Ecology Progress Series*, 219: 11-24 (2001)

Golet, D. S. and B. B. Ward. Vertical distribution of denitrification potential, denitrifying bacteria and benzoate utilization in intertidal microbial mat communities. *Microbial Ecology*, 42: 22-34 (2001)

Casciotti, K. A. and B. B. Ward. Nitrite reductase genes in ammonia-oxidizing bacteria. *Applied and Environmental Microbiology*, 67: 2213-2221 (2001)

Bothe, H., G. Jost, M. Schloter, B. B. Ward and K.-P. Witzel. Molecular analysis of ammonia oxidation and denitrification in natural environments *FEMS Microbiological Reviews*, 24: 673-690 (2000)

Ward, B. B. 2000. Nitrification and the marine nitrogen cycle. In: D. Kirchman, ed. Microbial Ecology, Wiley-Liss, New York, pp 427-454 (2000)

Bronk, D. A. and B. B. Ward. Magnitude of DON release relative to gross nitrogen uptake in marine systems. *Limnology and Oceanography*, 45: 1879-1883 (2000)

Ward, B. B., D. P. Martino, M. C. Diaz and S. B. Joye. Analysis of ammonia-oxidizing bacteria from hypersaline Mono Lake, California on the basis of 16s rRNA sequences. *Applied and Environmental Microbiology*, 67: 2873-2881 (2000)

Bronk, D. A. and B. B. Ward. Gross and net nitrogen uptake and DON release in the euphotic zone of Monterey Bay, California. *Limnology and Oceanography*, 44:573-585 (1999)

Voytek, M. A., B. B. Ward and J. C. Priscu. The distribution and relative abundance of ammonia-oxidizing bacteria in six Antarctic Dry Valley lakes. *Hydrobiologia*, 401: 113-130 (1999).

Francis, C. A., A. K. Francis, D. S. Golet and B. B. Ward. Quantification of catechol 2,3-dioxygenase gene homology abundance in intertidal sediments. *Aquatic Microbial Ecology*, 15: 225-231. (1998)

Hogan, M. E. and B. B. Ward. Acclimation of a marine microbial sediment community to simulated in situ exposure of 2,4-dichlorophenoxyacetic acid. *Microbial Ecology*, 35: 72-82. (1998)

Voytek, M. A., B. B. Ward and J. C. Priscu. The abundance of ammonia-oxidizing bacteria in Lake Bonney, Antarctica determined by immunofluorescence, PCR and in situ hybridization. Antarctic Research Series, *The McMurdo Dry Valleys*, pp. 217-228. (1998)

Diaz, C. M. and B. B. Ward. Sponge mediated nitrification in tropical benthic communities. *Marine Ecology Progress Series,* 156: 97-107. (1997)

Bard, D. G. and B. B. Ward. A species-specific bacterial productivity method using immunomagnetic separation and radiotracer experiments. *Journal of Microbiological Methods*, 28: 207-219. (1997)

Ward, B.B. and J.C. Priscu. Detection and characterization of denitrifying bacteria in an ice-covered Antarctic Lake. *Hydrobiologia*, 347: 57-68. (1997)

Ward, B. B., K. J. Courtney and J. H. Langenheim. Inhibition of *Nitrosomonas europaea* by monoterpenes from coastal redwood (*Sequois sempervirens*) in whole cell studies. *Journal of Chemical Ecology*, 23: 2583-2598. (1997)

Ward, B.B., M.A. Voytek, K.-P. Witzel. Population diversity of ammonium oxidizers investigated by specific PCR amplification. *Microbial Ecology*, 33: 87-96. (1997)

Ward, B.B. Nitrification and denitrification: Probing the nitrogen cycle in aquatic environments. *Microbial Ecology*, 32: 247-261. (1996)

Ward, B. B. Nitrification and ammonification in aquatic systems. *Life Supp. Biosph. Sci*., 3: 25-29. (1996)

Ward, B.B.. Functional and taxonomic probes for bacteria in the nitrogen cycle. Ed. I. Joint, NATO workshop on <u>*Molecular Ecology of Aquatic Microbes*</u>, pp. 73-86. (1995)

Ward, B.B. Diversity in denitrifying bacteria: Limits of DNA RFLP analysis and probes for the functional gene, nitrite reductase. *Archives of Microbiology*, 163: 167-175. (1995)

Voytek, M.A. and B.B. Ward. Detection of ammonium-oxidizing bacteria of the beta-subdivision proteobacteria in aquatic samples using the polymerase chain reaction. *Applied and Environmental Microbiology*, 61: 1441-1450. (1995)

Bronk, D.A., P.M. Glibert and B.B. Ward. Nitrogen uptake, dissolved organic nitrogen release and new production. *Science*, 265: 1843-1846. (1994)

Miller, L.G. , M.D. Coutlakis, R.S. Oremland and B.B. Ward. Selective inhibition of nitrification (ammonium oxidation) by methylfluoride and dimethyl ether. *Applied and Environmental Microbiology*, 59: 2457-2464. (1993)

Ward, B.B., A.R. Cockcroft and K.A. Kilpatrick. Antibody and DNA probes for detection of nitrite reductase in seawater. *Journal of General Microbiology*, 139: 2285-2293. (1993)

Ward, B.B. and A.R. Cockcroft. Immunofluorescence detection of the denitrifying bacterium, *Pseudomonas perfectomarina*, in seawater and intertidal sediment environments. *Microbial Ecology*, 25: 233-246. (1993)

Ward, B.B. and K.A. Kilpatrick. Methane oxidation associated with mid-depth methane maxima in the Southern California Bight. *Continental Shelf Research*, 13: 1111-1122. (1993)

Kerkhof, L.J. and B.B. Ward. Comparison of nucleic acid hybridization and fluorometry for measurement of RNA/DNA relationship with growth rate in a marine bacterium. *Applied and Environmental Microbiology*, 59: 1303-1309. (1993)

Hansell, D.A., B.B. Ward and P.M. Williams. Measurements of DOC and DON in the Southern California Bight using oxidation by high temperature combustion. *Deep-Sea Research*, 40: 219-234. (1993)

DeLong, E.F. and B.B. Ward. Biological oceanography from a molecular perspective. *Oceanus* 35: 47-54. (1992)

Ward, B.B. The subsurface methane maximum in the Southern California Bight. *Continental Shelf Research*, 12: 735-752. (1992)

Ward, B.B. Nitrogen cycle of the sea. *Encyclopedia of Earth System Science, Academic Press, Inc.*, 3: 295-206. (1992)

Ward, B.B. and K.A. Kilpatrick. Nitrogen transformations in the oxic layer of permanent anoxic basins: The Black Sea and the Cariaco Trench. E. Izdar and J.W. Murray (eds.): *Black Sea Oceanography,* Kluwer Academic Publishers, The Netherlands, pp. 111-124. (1991)

Reeburgh, W.S., B.B. Ward, S.C. Whalen, K.A. Sandbeck, K.A. Kilpatrick, and L.J. Kerkhof. Black Sea Methane Geochemistry. *Deep Sea Research*. (1991)

Ward, B.B. Immunology in Biological Oceanography and Marine Ecology. *The Oceanography Magazine*, 3: 30-35. (1991)

Ward, B.B. and K.A. Kilpatrick. Relationship between substrate concentration and oxidation of ammonium and methane in a stratified water column. *Continental Shelf Research*, 10: 1193-1208. (1990)

Lipschultz, F., S.C. Wofsy, B.B. Ward, L.A. Codispoti, G. Friederich, and J.W. Elkins. Bacterial transformations of inorganic nitrogen in the oxygen deficient waters of the eastern tropical south Pacific Ocean. *Deep-Sea Research*, 37: 1513-1541. (1990)

Ward, B.B. Kinetics of ammonia oxidation by a marine nitrifying bacterium: Methane as a substrate analogue. *Microbial Ecology*, 19: 211-226. (1990)

Ward, B.B., H.E. Glover, and F. Lipschultz. Chemoautotrophic activity and nitrification in the oxygen minimum zone off Peru. *Deep-Sea Res.,* 36: 1031-1051. (1989)

Ward, B.B., K.A. Kilpatrick, E. Renger, and R.W. Eppley. Biological nitrogen cycling in the nitracline. *Limnol. Oceanogr.,* 34: 493-513. (1989)

Spinrad, R.W., H.E. Glover, B.B. Ward, L. A. Codispoti, and G. Kullenberg. Suspended particle and bacterial maxima in Peruvian coastal waters during a cold water anomaly. *Deep-Sea Res.,* 36: 715-733. (1989)

Ward, B.B., K.A. Kilpatrick, A.E. Wopat, E.C. Minnich, and M.E. Lidstrom. Methane oxidation in Saanich Inlet during summer stratification. *Continental Shelf Res*., 9: 65-75. (1989)

Ward, B.B. and O.C. Zafiriou. Nitrification and nitric oxide in the oxygen minimum of the eastern tropical North Pacific. *Deep-Sea Res.,* 35: 1127- 1142. (1988)

Heyman, U., B. Heyman, and B.B. Ward. Cell affinity chromatography for a marine nitrifying bacterium. IN: C.M. Yentsch, F.C. Mague and P.K. Moran (Eds.), *Immunochemical*

Approaches to Estuarine, Coastal and Oceanographic Questions, Springer-Verlag, pp. 100-116. (1988)

Ward, B.B. Nitrogen transformations in the Southern California Bight. *Deep-Sea Res.,* 34: 785-805. (1987)

Ward, B.B. Kinetic studies on ammonia and methane oxidation by *Nitrosococcus Oceanus. Arch. Microbiol.,* 147: 126-133. (1987)

Ward, B.B., K .A. Kilpatrick, P.C. Novelli, and M.I. Scranton. Methane oxidation and methane fluxes in the ocean surface layer and in deep anoxic waters. *Nature*, 327: 226-229. (1987)

Ward, B.B. Nitrification in Marine Environments, pp. 157-184. IN: J.I. Prosser (Ed.), *Nitrification. Special Publications of the Society for General Microbiology*, Vol. 20, IRL Press, Oxford. (1986)

Codispoti, L.I., G.E. Friederich, T.T. Packard, H.E. Glover, R.T. Barker, J.W. Elkins, B.B. Ward, F. Lipschultz, and N. Lostaunau. Extremely high nitrite levels off northern Peru: A signal of instability in the marine denitrification rate. *Science*, 233: 1200-1202. (1986)

Ward, B.B. and A.F. Carlucci. Marine ammonium- and nitrite-oxidizing bacteria: Serological diversity determined by immunofluorescence in culture and in the environment. *Appl. Environ. Microbiol.,* 50: 194-201. (1985)

Ward, B.B. (Editor). Aquatic Nitrogen Cycles. Special Edition of *Marine Chemistry*. (1985)

Ward, B.B. Light and substrate concentration effects on marine ammonium assimilation and oxidation rates. *Mar., Chem.,* 16: 301-316. (1985)

Ward, B.B., M.C. Talbot, and M.J. Perry. Contributions of phytoplankton and nitrifying bacteria to ammonium and nitrite dynamics in coastal water. *Cont. Shelf Res.,* **3**: 383-398. (1984)

Ward, B.B. Photosynthesis and bacterial utilization of phytoplankton exudates: Results from pre- and post-incubation size fractionation. *Oceanol. Acta,* 7: 337-343. (1984)

Karl, D.M., G.A. Knauer, J.H. Martin, and B.B. Ward. Bacterial chemolithotrophy in the ocean is associated with sinking particles. *Nature,* 309: 54-56. (1984)

Ward, B.B. Autotrophic activity of ammonium-oxidizing bacteria: Combined autoradiography and immunofluorescence for estimation of single cell activity in the primary nitrite maximum off the coast of Washington. *Limnol. Oceanogr.,* 29: 402-410. (1984)

Ward, B.B. Oceanic distribution of ammonium-oxidizing bacteria determined by immunofluorescent assay. *J. Mar. Res.,* 40: 1155-1172. (1982)

Ward, B.B., R.J. Olson, and M.J. Perry. Microbial nitrification rates in the primary nitrite maximum off Southern California. *Deep-Sea Res*., 29: 247-255. (1982)

Ward, B.B. and M.J. Perry. Immunofluorescent assay for the marine ammonium-oxidizing bacterium *Nitrosococcus oceanus*. *Appl. Environ. Microbiol*, 39: 913-918. (1980)

CURRENT RESEARCH PROGRAMS

2011-2014 National Science Foundation, DEB-Ecosystems Science: Dimensions of Biodiversity: Collaborative Research: Functional diversity of marine eukaryotic phytoplankton and their contributions to the C and N cycles. (Co-PIs Daniel Sigman, Princeton, and Andrew Allen, J. Craig Venter Institute).

2011-2014 National Oceanographic and Atmospheric Administration: Effects of climate change on phytoplankton community composition and carbon cycling.

2010-2013 National Science Foundation, DEB-Ecosystems Science: Environmental control

of microbial N_20 fluxes and DIN loss in salt marsh sediments.

2010-2013 National Science Foundation, Chemical Oceanography: Collaborative Research: Control of Denitrification and Anammox in the Oxygen Deficient Waters of the Eastern Tropical North and South Pacific.

RESEARCH CRUISES AND EXPEDITIONS

2011 R/V Atlantic Explorer, Bermuda, 4 days, Nov

2009 R/V Atlantic Explorer, Bermuda, 5 days, Dec

2007 Chief Scientist, R/V Roger Revelle, Arabian Sea, 30 days, Sep – Oct.

2005 McMurdo Station and Lake Bonney, Antarctica, 6 weeks, Nov-Dec.
R/V Knorr, Eastern Tropical North Pacific, 21 days, Oct-Nov.

2004 McMurdo Station and Lake Bonney, Antarctica, 7 weeks, Nov-Dec.
R/V Cape Henlopen, Sargasso Sea, 4 days, Oct, Chesapeake Bay, 3 days Oct.

2003 R/V Cape Henlopen, Sargasso Sea, Chesapeake Bay, 3 days Apr, June, Oct.

2002 R/V Cape Henlopen, Sargasso Sea, 4 days, Apr, Chesapeake Bay, 3 days Oct.

2001 R/V Cape Henlopen, Chesapeake Bay, 3 days, Aug, 3 days Oct.

2000 McMurdo Station and Lake Bonney, Antarctica, 6 weeks, Nov-Dec.

1999 Chief scientist, R/V Point Sur, Monterey Bay, 5 bimonthly 1-day cruises.
McMurdo Station and Lake Bonney, Antarctica, 7 weeks, Nov-Dec

1998 Chief scientist, R/V Point Sur, Monterey Bay, 6 bimonthly 1-day cruises.

1996 R/V Sagar Sampada, Arabian Sea, 13 days, November.

1995 Chief Scientist, R/V New Horizon, Eastern Tropical North Pacific, 28 days, July.

1994 Chief Scientist, R/V Sproul, Southern California Bight, 6 days, April.
McMurdo Station and Lake Bonney, Antarctica, 6 weeks, Nov-Dec.

1993 Chief Scientist, R/V Point Sur, Monterey Bay, 6 days, March.
Chief Scientist, R/V Point Sur, Monterey Bay, 6 days, October.

1992 Chief Scientist, R/V Sproul, Southern California Bight, 6 days, October.
McMurdo Station and Lake Bonney, Antarctica, 6 weeks, Nov-Dec.

1990 R/V New Horizon, Southern California Bight, 14 days, July.
R/V New Horizon, Southern California Bight, 10 days, January.

1988 Chief Scientist, R/V Sproul, Southern California Bight, 5 days, October.
R/V Knorr, Black Sea, 16 days, July.
Chief Scientist, R/V Sproul, Southern California Bight, 5 days, June.

1987 R/V New Horizon, CaBS Cruise-7, Southern California Bight, 3 days, October.

1986 Chief Scientist, R/V Barnes, Saanich Inlet, British Columbia, 4 days, September.
Chief Scientist, R/V Barnes, Saanich Inlet, British Columbia, 4 days, August.

1986 R/V Iselin, Cariaco Trench, 30 days, February-March.

1985 R/V Sproul, SCBS Cruise-23, Southern California Bight, 7 days, May.
R/V Wecoma, Nitrogen transformations in the oxygen minimum zone off Peru, eastern tropical Pacific, 35 days, March.

1983 R/V Wecoma, eastern subtropical Pacific, 30 days, November.

1982 R/V New Horizon, SCBS Cruise-22, Southern California Bight, 10 days, May.

	R/V New Horizon, SCBS Cruise-21, Southern California Bight, 5 days, November.
1981	R/V T. G. Thompson, DOE-sponsored Northwest Marine Sciences Group cruise, Northeastern Pacific Ocean, 21 days, August.
1980	R/V T. G. Thompson, DOE-sponsored Northwest Marine Sciences Group cruise, Northeastern Pacific Ocean, 21 days, September.
1979	R/V Oceanus, Northeast Atlantic, 14 days, November.
	R/V T. G. Thompson, subtropical Pacific, 30 days, September.
	R/V T. G. Thompson, DOE-sponsored Northwest Marine Sciences Group cruise, Northeastern Pacific Ocean, 21 days, July.
1978	R/V T. G. Thompson, DOE-sponsored Northwest Marine Sciences Group cruise, Northeastern Pacific Ocean, 7 days, May.
	R/V T. G. Thompson, DOE-sponsored Northwest Marine Sciences Group cruise, Northeastern Pacific Ocean, 7 days, March.
1977	R/V T. G. Thompson, DOE-sponsored Northwest Marine Sciences Group cruise, Northeastern Pacific Ocean, 10 days, September.
	R/V T. G. Thompson, DOE-sponsored Northwest Marine Sciences Group cruise, Northeastern Pacific Ocean, 7 days, April.

SELECTED PROFESSIONAL ACTIVITIES / UNIVERSITY SERVICE (10 years)

2010	Panel Member, Chemical Oceanography, National Science Foundation
2010	Steering Committee, NSF Geotraces workshop: The molecular biology of biogeochemistry: Using molecular methods to link ocean chemistry with biological activity
2008-2009	Member, President's Committee on Climate Science at Princeton, Princeton University
2006-2007	Member, Committee of Three, Princeton University
2005	Panel Member, Biological Oceanography, National Science Foundation
2005-2006	Chair, Graduate Work Committee, Department of Geosciences
2004-2006	Princeton Environmental Institute, Chair of undergraduate program
2004-present	Nitrification Network RCH, steering committee
2004	Discussion Leader, Picoplankton Gordon Conference, June
	Special Sessions Chair, ASLO 2004 February meeting
	Member, Scientific Advisory Council, Plymouth Marine Laboratory
2001-2003	Member, President's Task Force on the Status of Women in the Sciences and Engineering at Princeton University
2001-2006	Member, Radiation Safety Committee, Princeton University
2001-2002	Chair, American Society for Limnology and Oceanography Public Policy and Outreach Committee
2001-2004	Member, Steering committee for Coastal Ocean Processes (CoOP)
2001	Panel Member, Biological Oceanography, National Science Foundation
2001	Panel Member, Microbial Observatories, National Science Foundation
2001	Discussion Leader, Chemical Oceanography Gordon Conference, August
2000-present	Member, Executive Committee for the Princeton Environmental Institute

1999-2003	Member, Council on Science and Technology, Princeton University
1999-present	Member, Interdepartmental Committee for the Program in Environmental Studies, Princeton Environmental Institute
1996-Present	Editorial Board Member, Microbial Ecology
1995-2006	Editorial Board Member, Global Change Biology journal

CLASSROOM TEACHING (last five years)

Environmental Microbiology (GEO 417), Biological Oceanography (GEO 428), Environmental Studies (ENV 202), Fundamentals of Geosciences (GEO 505/506)

OTHER TEACHING

Thesis Advisor, Ph.D. Students:

Lee Kerkhof (UCSD), Ph.D. 1991
Mary Voytek (UCSC), Ph.D. 1996
Karen Casciotti (Princeton), Ph.D. 2002
Gregory O'Mullan (Princeton), Ph.D. 2005
Anita Adhitya (Princeton), Ph.D. 2009
Silvia Newell (Princeton), Ph.D. 2010
Sarah Fawcett (Princeton), 2007 – present
Andrew Babbin (Princeton), 2009 – present
Nick Peng (Princeton), 2010 – present
Jimmi Ji (Princeton), 2011 – present

Postdoctoral Scholars:

Dr. Bonnie X. Chang, 2010 – present
Dr. Jenifer Bowen, 2007 – 2010
Dr. Nicholas Bouskill, 2006 - 2009
Dr. Punyasloke Bhadury, 2006 - 2008
Dr. Gregory O'Mullan, 2005 - 2006
Dr. Jenny Baeseman, 2004 - 2006
Dr. Jeremy Rich, 2004 - 2007
Dr. Caroline Tuit, 2003 - 2006
Dr. Andrew Allen, 2002 - 2006
Dr. Chris Francis, 2001 - 2003
Dr. Bongkeun Song, 2000 - 2004
Dr. Gaspar Taroncher-Oldenburg, 2000 - 2002
Dr. Amal Jayakumar, 2000 - 2004
Dr. Melissa Staid, 1998 - 2000
Dr. Darryl Martino, 1998-2000
Dr. Deborah Bronk, 1992-1994
Dr. Dennis Hansell, 1989-1991