

Cumulative Bio-Bibliography
Princeton University
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POSITIONS HELD

2016-Present Trustee, Bermuda Institute of Ocean Sciences, Bermuda
2012-2013 Visiting Scientist (Sabbatical), Plymouth Marine Laboratory
2010-2022 Trustee, Plymouth Marine Laboratory, Plymouth UK
2007-2011 Visiting Scientist, Plymouth Marine Laboratory
Plymouth UK, July – August annually
2006-2022 Chair, Department of Geosciences
Princeton University
2004 Visiting Scientist (Sabbatical), Plymouth Marine Laboratory
Plymouth UK, January - August
1998-Present Professor, Department of Geosciences and the Princeton (High Meadows)
Environmental Institute, Princeton University
1995-1998 Chair, Ocean Sciences Department
University of California, Santa Cruz
1995-1998 Professor, Ocean Sciences Department
University of California, Santa Cruz
1993 Visiting Scientist, Max Planck Institute für Limnologie
Plön, Germany, October-December
1991-1995 Associate Professor, Marine Sciences Department
University of California, Santa Cruz
1989-1991 Assistant Professor of Marine Sciences
University of California, Santa Cruz
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
1984-1989 Assistant Research Oceanographer, Institute of Marine Resources,
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 Graduate Teaching Assistant, Friday Harbor Laboratories,

(Summer) Department of Oceanography, University of Washington
1977 Graduate Teaching Assistant, Department of Oceanography,
(Fall) 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, American Society for Microbiology, 2012
Samuel A. Waxman Honorary Lectureship, Theobald Smith Society, 2014
Rachel Carson Award Lecture, American Geophysical Union, 2014
(WHOI) Chemical Oceanography H. Burr Steinbach Scholar of 2015
Charnock Lecturer, Southampton Oceanography Center, UK, 2015
Marie Tharp Award Lecture, Helmholtz Center for Ocean Research, Kiel, Germany, 2016
AGU College of Fellows, 2022

RESEARCH INTERESTS:

Marine and global nitrogen cycle, molecular analyses to link marine phytoplankton, bacteria and microbial processes (especially nitrification and denitrification), oxygen minimum zones, phytoplankton nitrogen dynamics, microbial genomics

PUBLICATIONS

In Press

Wan, X. S., Sheng, H.-X., Shen, H., Zou, W., Tang, J.-M., Wang, D., Dai, M., Kao, S.-J., Ward, B. B. Significance of urea oxidation to nitrite production in the oligotrophic ocean. *Global Biogeochemical Cycles*.
Fortin, S. G., Sun, X., Jayakumar, A., and Ward, B. B. Novel nitrite-oxidizing bacteria minimize nitrogen loss in the ocean. *ISME Journal*.

Published

- Frey, C., Tang, W., Ward, B. B., and Lehmann, M. Sample preservation methods for nitrous oxide concentration and isotope ratio measurements in aquatic environments. *Limnology and Oceanography Methods*. <https://doi.org/10.1002/lom3.10638> (2024)
- Tang, W., Talbott, J., Jones, T., Ward, B. B. Effluents of wastewater treatment plants are overlooked sources of N₂O to the atmosphere. *Biogeosciences*. doi.org/10.5194/egusphere-2024-638 (2024)
- Tang, W., Fortin, S. G., Intrator, N., Lee, J. A., Kunes, M. A., Jayakumar, A., and Ward, B.B. Determination of site-specific nitrogen cycle reaction kinetics allows accurate simulation of in situ nitrogen transformation rates in a large North American estuary. *Limnology and Oceanography*. doi: 10.1002/lno.12628 (2024)
- Zhao, R., Zhang, I. H., Jayakumar, A., Ward, B. B. and Babbin, A. R. Origin, age, and metabolisms of dominant anammox bacteria in the global oxygen deficient zones. *ISME Communications*. doi.org/10.1093/ismeco/ycae060 (2024)
- Intrator, N., Jayakumar, A., and Ward, B.B. Nitrous Oxide Reductase gene (*nosZ*) Phylogeny and Aquatic Biogeography. *Frontiers in Microbiology*. 15. <https://doi.org/10.3389/fmicb.2024.1407573> (2024)
- Qin, W., Wei, S., Zheng, Y., Choi E., Li. X. , Juliet Johnston, J., Wan, X., Abrahamson, B., Flinkstrom, Z., Wang, B., Li, H., Hou, L., Sun, X., Wells, M., Ngo, L., Hunt, K., Urakawa, H., Tao, X., Wang, D., Wang, D., Pan, C., Weber, P., Jiang, J., Zhou, J., Zhang, Y., Stahl, D., Ward, B., Mayali, X., Martens-Habbena, W., Winkler, M.-K. Differential substrate affinity and catabolite repression enable preferential use of urea by ammonia-oxidizing bacteria. *Nature Microbiology*. 9(2), 524-536. doi:10.1038/s41564-023-01593-7 (2024)
- Kelly, C.L., Travis, N. M., Baya, P. A., Frey, C., Sun, X., Ward, B. B., Casciotti, K. L. Isotopomer labeling and oxygen dependence of hybrid nitrous oxide production. *Biogeosciences*, 21:3215–3238. <https://doi.org/10.5194/bg-21-3215-2024> (2024)
- Wan, X. S., Sheng, H-X., Liu, L., Shen, H, Tang, W., Zou, W., Xu, M. N., Zheng, Z., Tan, E., Chen, M., Zhang, Y., Ward, B. B., Kao, S-J. Particle-associated denitrification is the primary source of N₂O in oxic coastal waters. *Nature Communications*. 14: 8280, doi.org/10.1038/s41467-023-43997-3 (2023)
- Tang, T., Ward, B., Beman, M, Bristow, L., Clark, D., Fawcett, S., Frey, C, Fripiat, F., Herndl, G., Mduyana, M., Paulot, F., Peng, X., Santoro, A., Shiozaki, T., Sintez, E., Stock, C., Sun, X., Wan, X., Xu, M., and Zhang, Y. Database of nitrification and nitrifiers in the global ocean. *Earth System Science Data*. 15: 5039–5077, doi.org/10.5194/essd-15-5039-2023 (2023)
- Tracey, J. C., Babbin, A. R., Wallace, E. R., Sun, X, DuRussel, K. L., Frey, C., Martocello III, D. E., Tamasi, T., Oleynik, S. and Ward, B. B. All about Nitrite: Exploring Nitrite Sources and Sinks in Oxygen Minimum Zones. *Biogeosciences* 20, 2499–2523, doi.org/10.5194/bg-20-2499-2023 (2023)

- Zhang, I. H., Sun, X., Jayakumar, A., Fortin, S. G., Ward, B. B., and Babbin, A. R. Partitioning of the denitrification pathway and other nitrite metabolisms within global oxygen deficient zones. *ISME Communications*, 3, 76, doi:10.1038/s43705-023-00284-y (2023)
- Sun, X., Frey, C. and Ward, B. B. Nitrite oxidation across the full oxygen spectrum in the ocean. *Global Biogeochemical Cycles*. doi: 10.1029/2022GB007548 (2023)
- Sheng, H.-X. Wan, X. S., Zou, B., Sun, Y., Hanoach, B., Zou, W., Yang, W., Wu, S., Huang, H., Ward, B. B. and Kao, S.-J. An efficient diazotroph derived nitrogen transfer pathway in coral reef system. *Limnology and Oceanography*. doi.org/10.1002/lno.12324 (2023)
- Wan, X. S., Hou, L., Kao, S.-J., Zhang, Y., Sheng, H.-X., Shen, H., Qin, W. and Ward, B. B. Pathways of N₂O production by marine ammonia-oxidizing archaea determined from dual isotope labeling. *PNAS*. 120: e2220697120. doi.org/10.1073/pnas.2220697120 (2023)
- Wan, X. S., Hua-Xia Sheng, Dai, M., Casciotti, K. L., Church, M. J., Zou, W., Liu, L., Shen, H., Zhou, K., Ward, B. B. and Kao, S.-J. Epipelagic nitrous oxide production offsets carbon sequestration by the biological pump. *Nature Geoscience*. doi.org/10.1038/s41561-022-01090-2 (2022)
- Frey, C., Sun, X., Szemberski, L., Casciotti, K. L., Garcia-Robledo, E., Jayakumar, A., Kelly, C. L., Lehmann, M. F. and Ward, B. B. Nitrous oxide production kinetics from ammonia oxidation in the Eastern Tropical North Pacific. *Limnology and Oceanography*. doi: 10.1002/lno.12283 (2022)
- Kolody, B. C., Smith, S. R., Zeigler Allen, L., McCrow, J. P., Moustafa, A., Shi, D., Hopkinson, B. M., Morel, F. M. M., Ward, B. B. and Allen, A. E. Nitrogen and iron availability drive metabolic remodeling and natural selection of diverse phytoplankton during experimental upwelling. *mSystems*. 7:5. doi:10.1128/msystems.00729-22 (2022)
- Wan, X. S., Lin, H., Ward, B. B., Kao, S.-J. and Dai, M. Significant seasonal N₂O dynamics revealed by multi-year observations in the Northern South China Sea. *Global Biogeochemical Cycles*. 6:10. doi:10.1029/2022GB007333 (2022)
- Tang, W., Jayakumar, A., Sun, X., Tracey, J., Carroll, J. T., Wallace, E., Lee, J. A., Nathan, L. and Ward, B. B. Nitrous oxide consumption in oxygenated and anoxic estuarine waters. *Journal of Geophysical Research*. doi: 10.1029/2022GL100657 (2022)
- Mdutyana, M., Marshall, T., Sun, X., Burger, J. M., Thomalla, S. J., Ward, B. B. and Fawcett, S. E. Controls on nitrite oxidation in the upper Southern Ocean: insights from winter kinetics experiments in the Indian sector *Biogeosciences*. 19:3425-3444. doi:10.5194/bg-19-3425-2022 (2022)
- Tang, W., Tracey, J., Carroll, J. T., Wallace, E., Lee, J. A., Nathan, L., Sun, X., Jayakumar, A. and Ward, B. B. Nitrous oxide production in Chesapeake Bay. *Limnology and Oceanography*. 67: 2101-2116. doi:10.1002/lno.12191 (2022)
- Mdutyana, M., Sun, X., Burger, J. M., Flynn, R. F., Smith, S., van Horsten, N. R., Roychoudhury, A. N., Planquette, H., Bucciarelli, E., Thomalla, S. J., Ward, B. B., Fawcett, S. E. The kinetics of ammonium uptake and oxidation across the African sector of the Southern Ocean. *Limnology and Oceanography*. 67: 973-991 doi: 10.1002/lno.12050 (2022)
- Carroll, J. T., Van Oostende, N. C., Ward, B. B. Evaluation of genomic sequence-based growth rate methods for synchronized *Synechococcus* cultures. *Applied and Environmental Microbiology*. 10.1128/AEM.01743-21 (2022)
- Lueders-Dumont, J. A., Forden, A. G., Mohan, J. A., Walther, B. C., Kast, E. R., Sigman, D. M., and Ward, B. B. Controls on the nitrogen isotopic composition of fish otolith organic

- matter: Lessons from a controlled diet switch experiment *Geochimica et Cosmochimica Acta*. 316: 69-86 doi:10.1016/j.gca.2021.09.030 (2022)
- Peng, X., Ji, Q., Angell, J. H., Kearns, P. J., Bowen, J. L. and Ward, B. B. Long-Term fertilization alters nitrous oxide cycling dynamics in salt marsh sediments. *Environ. Sci. Technol.* 55: 10832–10842 doi:10.1021/acs.est.1c01542 (2021)
- Wan, X. S., Sheng, H.-X., Dai, M., Church, M. J., Zou, W., Li, X., Hutchins, D. A., Ward, B. B., Kao, S. J. Phytoplankton-nitrifier interactions control the geographic distribution of nitrite in the upper ocean. *Global Biogeochemical Cycles*. doi:10.1029/2021GB007072 (2021)
- Schulz, K. G., Achterberg, E. P., Arístegui, J., Bach, L. T., Banos, I., Boxhammer, T., Erler, D., Igarza, M., Kalter, V., Ludwig, A., Löscher, C., Meyer, J., Meyer, J., Minutolo, F., von der Esch, E., Ward, B. B. and Riebesell, U. Nitrogen loss processes in response to upwelling in a Peruvian coastal setting dominated by denitrification. *Biogeochemistry*, 18: 4305-4320 doi:10.5194/bg-18-4305-2021. (2021)
- Sun, X. and Ward, B. B. Novel metagenome-assembled genomes involved in the nitrogen cycle from a Pacific oxygen minimum zone. *ISME Communications*, 1:26 doi: 10.1038/s43705-021-00030-2 (2021)
- Rees, A. P., Brown, I. J., Jayakumar, A., Lessin, G., Somerfield, P. J., and Ward, B. B. Biological nitrous oxide consumption in oxygenated waters of the high latitude Atlantic Ocean. *Communications Earth and Environment*, 2:36 (2021)
- Bourbonnais, A., Frey, C., Sun, X., Bristow, L. A., Jayakumar, J., Ostrom, N. E., Casciotti, K. L. and Ward, B. B. Protocols for assessing transformation rates of nitrous oxide in the water column. *Frontiers in Marine Science*. doi: 10.3389/fmars.2021.611937 (2021)
- Sun, X., Frey, C., Garcia-Robledo, E., Jayakumar, A., and Ward, B. B. Anaerobic nitrite oxidation: A missing component in the nitrogen cycle. *ISME Journal*. 15:1317-1329 10.1038/s41396-020-00852-3 (2021)
- Sun, X., A. Jayakumar, J. Tracey, E. Wallace, C. Kelly, K. Casciotti, and B. B. Ward. Microbial N₂O consumption in and above marine N₂O production hotspots. *ISME Journal*. 15:1434-1444 doi:10.1038/s41396-020-00861-2 (2021).
- Jayakumar, A., and Ward, B. B. Diversity and distribution of nitrogen fixation genes in the oxygen minimum zones of the world oceans. *Biogeosciences*, 17, 5953–5966 (2020)
- Wilson, S. T., Al-Haj, A. N., Bourbonnais, A., Frey, C., Fulweiler, R. W., Kessler, J. D., Marchant, H. K., Milucka, J., Ray, N. E., Suntharalingham, P., Thornton, B. F., Upstill-Goddard, R. C., Weber, T. S., Arévalo-Martínez, D. L., Bange, H. W., Benway, H. M., Bianchi, D., Borges, A. V., Chang, B. X., Crill, P. M., del Valle, D. A., Farías, L., Joye, S. B., Kock, A., Labidi, J., Manning, C. C., Pohlman, J. W., Rehder, G., Sparrow, K. J., Tortell, P. D., Treude, T., Valentine, D. L., Ward, B. B., Yang, S. and Yurganov, L. N. Ideas and perspectives: A strategic assessment of methane and nitrous oxide measurements in the marine environment. *Biogeosciences*. 17, 5809–5828 (2020)
- Mdutyana, M., Thomalla, S., Philibert, R., Ward, B. B., and Fawcett, S. E. The seasonal cycle of nitrogen uptake and nitrification in the Atlantic sector of the Southern Ocean. *Global Biogeochemical Cycles*, 34, doi.org/10.1029/2019GB006363 (2020)
- Lueders-Dumont, J., D. M. Sigman, B. Johnson, O. Jensen and B. B. Ward. Comparison of the isotopic composition of fish otolith-bound organic N with host tissue. *Canadian Journal of Fisheries and Aquatic Sciences*. 77: 264-275. doi.org/10.1139/cjfas-2018-0360 (2020)

- Damgaard, L. R., C. Kelly, K. L. Casciotti, B. B. Ward, and N. P. Revsbech. Amperometric sensor for nanomolar nitrous oxide analysis. *Analytica Chimica Acta*. 1101: 135-140. doi.org/10.1016/j.aca.2019.12.019 (2020)
- Frey, C., Bange, H. W., Achterberg, E. P., Jayakumar, A., Löscher, C. R., Arévalo-Martínez, D. L., León-Palmero, E., Sun, X. Sun, M., Xie, R. C., Oleynik, S., and Ward, B.B. Regulation of nitrous oxide production in low oxygen waters off the coast of Peru, *Biogeosciences*, 17:2263-2287 doi.org/10.5194/bg-2019-476 (2020)
- Zhang, X., B. B. Ward and D. M. Sigman. Global nitrogen cycle: Critical enzymes, organisms and processes for nitrogen budgets and dynamics. *Chemical Reviews*, 120: 5308-5351. doi.org/10.1021/acs.chemrev.9b00613 (2020)
- Rich, J. J., P. Arevalo, B. X. Chang, A.H. Devol, B. B. Ward. Anaerobic ammonium oxidation (anammox) and denitrification in Peru margin sediments. *Journal of Marine Systems*. doi.org/10.1016/j.jmarsys.2018.09.007 (2020)
- Babbin, A. R., C. Buchwald, F. M. M. Morel, S. D. Wankel, B. B. Ward. Nitrite oxidation exceeds reduction and fixed nitrogen loss in anoxic Pacific waters. *Marine Chemistry* doi.org/10.1016/j.marchem.2020.103814 (2020)
- Tracey, J., Coronado, M., Giessen, T., Lau, M. VC. Y., Silver, P., and Ward, B. B. The discovery of twenty-three new sequences encoding for encapsulin nanocompartments, including two in anammox bacteria. *Scientific Reports* doi.org/10.1038/s41598-019-56533-5 (2019)
- Aldunate, M. C. Henríquez-Castillo, Q. Ji, J. Lueders-Dumont, B. B. Ward, P. von Dassow, O. Ulloa. Nitrogen assimilation in picocyanobacteria inhabiting the anoxic marine zones of the eastern tropical North and South Pacific. *Limnology and Oceanography*. doi.org/10.1002/lno.11315 (2019)
- Eveillard, D., N. Bouskill, D. Vintache, J. Gras, B. B. Ward, J. Bourdon. Probabilistic modeling of microbial networks for integrating partial quantitative knowledge within the nitrogen cycle. *Frontiers in Microbiology*, doi.org/10.3389/fmicb.2018.03298 (2019)
- Chang, B. X., Jayakumar, A., Widner, B., Bernhardt, P., Mordy, C. W., Mulholland, M. R. and Ward, B. B. Dinitrogen fixation in the eastern tropical South Pacific. *Limnology and Oceanography*, 64: 1913-1923. (2019)
- Sun, X., Kop, L. F. M., Lau, M. C. Y., Frank, J., Jayakumar, A., Lücker, S., Ward, B. B. Uncultured *Nitrospina*-like species are major nitrite oxidizing bacteria in oxygen minimum zones. *ISME Journal* 10.1038/s41396-019-0443-7 (2019)
- Sabadel, A. J. M., Van Oostende, N. C., Ward, B. B., Woodward, E. M. S., Van Hale, R. and Frew, R. D. Characterization of particulate organic matter cycling during a summer North Atlantic phytoplankton bloom using amino acid C and N stable isotopes. *Marine Chemistry* doi.org/10.1016/j.marchem.2019.103670 (2019)
- Van Oostende, N., R. Dussin, C. A. Stock, A. D. Barton, E. Curchitser, J. P. Dunne and B. B. Ward. Simulation of the ocean chlorophyll dynamic range from oligotrophy to coastal upwelling. *Progress in Oceanography* 168: 232-247 (2018)
- Jayakumar A., D. Balachandran, A. P. Rees, P. J. Kearns, J. L. Bowen, B. B. Ward. Community composition of nitrous oxide reducing bacteria investigated using a functional gene microarray. *Deep-Sea Research* 156: 44-50 (2018)
- Ji, Q., E. Buitenhuis, P. Suntharalingam, J. L. Sarmiento and B. B. Ward. Global nitrous oxide production determined by oxygen sensitivity of nitrification and denitrification. *Global Biogeochemical Cycles* doi:10.1029/2018GB005887 (2018)

- Ji, Q., C. Frey, X. Sin, Y.-S. Lee, A. Jayakumar, M. Jackson, J. C. Cornwell and B. B. Ward. Nitrogen and oxygen availabilities control water column nitrous oxide production during seasonal anoxia in the Chesapeake Bay. *Biogeosciences* 15:6127-6138 (2018)
- Angell, J. H., A. Peng, Q. J. I. Craick, A. Jayakumar, P. J. Kearns, B. B. Ward, and J. L. Bowen. Community composition of nitrous oxide related genes and their relationship to nitrogen cycling rates in salt marsh sediments. *Frontiers in Microbiology*, doi:10.3389/fmicb.2018.00170. (2018)
- Lueders-Dumont, J., X. T. Wang, O. P. Jensen, D. M. Sigman and B. B. Ward. Nitrogen isotopic analysis of otolith-bound organic matter in modern and fossil fish otoliths. *Geochimica et Cosmochimica Acta*, 224:200-222 doi:10.1016/j.gca.2018.01. (2018)
- Peng, X., S. E. Fawcett, N. C. van Oostende, M. Wolf, D. Marconi, D. M. Sigman, and B. B. Ward. Nitrogen assimilation and nitrification in the subarctic North Atlantic Ocean. *Limnology and Oceanography*, 63: 1462-1487 (2018) doi:10.1002/lno.10784. (2018)
- Jääntti, H., B. B. Ward, J. W. Dippner, and S. Hietanen. Nitrification and the ammonia-oxidizing communities in the central Baltic Sea water column. *Estuarine, Coastal and Shelf Science* 202: 280-289. doi:10.1016/j.ecss.2018.01.019. (2018)
- Marconi, D., D. M. Sigman, K. L. Casciotti, E. C. Campbell, M. A. Weigand, S. E. Fawcett, A. N. Knapp, B. B. Ward, and G. H. Haug. Tropical dominance of nitrogen fixation in the North Atlantic Ocean. *Global Biogeochemical Cycles*, 31: 1608–1623. Doi:10.1002/2016GB005613 (2017)
- Lisa, J. A., A. Jayakumar, B. B. Ward and B. Song. *nirS* denitrifying bacterial assemblages respond to environmental conditions of a shallow estuary. *Environmental Microbiology Reports*, doi:10.1111/1758-2229.12594 (2017)
- Sun, X., Q. Ji, A. Jayakumar and B. B. Ward. Dependence of nitrite oxidation on nitrite and oxygen in low oxygen seawater. *Geophysical Research Letters*, 44: 7883-7891 DOI: 10.1002/2017GL074355 (2017)
- Jayakumar, A., B. X. Chang, B. Widner, P. Bernhardt, M. R. Mullholland and B.B. Ward. Biological nitrogen fixation in the oxygen minimum region of the Eastern Tropical North Pacific Ocean. *ISME Journal*, 11: 2356-2367 DOI: 10.1038/ismej.2017.97 (2017)
- Sun, X., A. Jayakumar and B. B. Ward. Community composition of nitrous oxide consuming bacteria in the oxygen minimum zone of the Eastern Tropical South Pacific. *Frontiers of Microbiology* 8, Article Number: 1183 DOI: 10.3389/fmicb.2017.01183 (2017)
- Ji, Q. and B. B. Ward. Nitrous oxide production in surface waters of the mid-latitude North Atlantic Ocean. *JGR-Oceans*, 122: 2612-2621 DOI: 10.1002/2016JC012467 (2017)
- Babbin, A. R., B. D. Peters, C. W. Mordy, B. Widner, K. L. Casciotti, and B. B. Ward. Multiple metabolisms constrain the anaerobic nitrite budget in the Eastern Tropical South Pacific. *Global Biogeochemical Cycles*, 31: 258-271 (2017)
- Van Oostende, N., S. E. Fawcett, D. Marconi, J. Lueders-Dumont, A. Sabadel, W. M. S. Woodward, B. Jonsson, D. M. Sigman, and B. B. Ward. Variation of summer phytoplankton community composition and its relationship to nitrate and ammonium assimilation across the North Atlantic Ocean. *Deep-Sea Research I*, 121: 79-94 (2017)
- Peters, B. D., A. R. Babbin, B. B. Ward, K. A. Lettmann, C. W. Mordy, O. Ulloa, and K. L. Casciotti. Vertical modeling of the nitrogen cycle in the eastern tropical south Pacific oxygen deficient zone using high resolution concentration and isotope measurements *Global Biogeochemical Cycles*, 30: 1661-1681 (2016)

- Horak, R. E. A., W. Reuf, B. B. Ward and A.H. Devol. Expansion of denitrification and anoxia in the eastern tropical North Pacific from 1972 to 2012. *Geophysical Research Letters*, 43(10): 5252-5260 (2016)
- Peng, X., C. A. Fuchsman, A. Jayakumar, M. J. Warner, A. H. Devol, and B. B. Ward. Revisiting nitrification in the Eastern Tropical South Pacific: A focus on controls, *J. Geophys. Res. Oceans*, 121, doi:10.1002/2015JC011455. (2016)
- Peng, Xuefeng, Qixing Ji, Angell J. H, Kearns, P. J., Yang, H. J., Bowen, J. L. and Ward B. B., Long-term fertilization alters the relative importance of nitrate reduction pathways in salt marsh sediments. *J. Geophys. Res. Biogeosci.*, 121, doi:10.1002/2016JG003484. (2016)
- Rees, A. P., I. J. Brown, A. Jayakumar and B. B. Ward. The inhibition of N₂O production by ocean acidification in cold temperate and polar waters. *Deep-Sea Research Part II*, 127:93-101 (2016)
- Ward, B. B. and N. C. Van Oostende. Phytoplankton assemblage during the North Atlantic spring bloom assessed from functional gene analysis. *Journal of Plankton Research*, doi: 10.1093/plankt/fbw043 (2016)
- Ji, Q., A. R. Babbin, A. Jayakumar, S. Oleynik, and B. B. Ward. Nitrous oxide production by nitrification and denitrification in the Eastern Tropical South Pacific oxygen minimum zone. *Geophysical Research Letters* 42:10755-10764 (2015)
doi.org/10.1002/2015GL066853
- Peng, X., C. A. Fuchsman, A. Jayakumar, S. Oleynik, W. Martens-Habbena, A. H. Devol and B. B. Ward. Ammonium and nitrite oxidation in the Eastern Tropical North Pacific. *Global Biogeochemical Cycles*, doi:10.1002/2015GB05278 (2015)
- Babbin, A. R., A. Jayakumar, O. L. Coyle and B. B. Ward. Organic matter loading modifies the microbial community responsible for nitrogen loss in estuarine sediments. *Marine Ecology Progress Series* doi:10.1007/s00248-015-0693-5 (2015)
- Fawcett, S. E., B. B. Ward, M. W. Lomas, D. M. Sigman. Vertical decoupling of nitrate assimilation and nitrification in the Sargasso Sea. *Deep-Sea Research Part I* 103:64-72 (2015)
- Bowen, J. L., Weisman, D., Yasuda, M. Jayakumar, A., Morrison, H. G. and Ward, B. B. Marine oxygen deficient zones harbor depauperate denitrifying communities compared to extensive novel genetic diversity in coastal sediments. *Microbial Ecology* 70:311-321 (2015)
- Ji, Q., A. R. Babbin, X. Peng, J. L. Bowen and B. B. Ward. Nitrogen substrate dependent nitrous oxide cycling in salt marsh sediments. *Journal of Marine Research* 73:71-92 (2015)
- Babbin, A. R., D. Bianchi, A. Jayakumar, B. B. Ward. Rapid nitrous oxide cycling in the suboxic ocean. *Science* 348:1127-1129 (2015)
- Van Oostende, N. C., J. P. Dunne, S. E. Fawcett and B. B. Ward. Phytoplankton succession explains size partitioning of new production during upwelling blooms. *Journal of Marine Systems* 148: 14-25 (2015)
- Zhang, E. S. Huang, Q. Ji, M. Silvernagel, Y. Wang, B. Ward, D. M. Sigman and G. Wysocki. Nitric Oxide Isotopic Analyzer Based on a Compact Dual-Modulation Faraday Rotation Spectrometer. *Sensors*, 15(10)(2015) doi: 10.3390/s151025992
- Tiano, L., E. G. Robledo, T. Dalsgaard, A. H. Devol, B. B. Ward, O. Ulloa, D. E. Canfield and N. P. Revsbech. Oxygen distribution and aerobic respiration in the north and south eastern tropical Pacific oxygen minimum zones. *Deep Sea Research I* 194: 173-183 (2014)

- Bowen, J. L., A. R. Babbin, P. J. Kearns and B. B. Ward. Connecting the dots: Linking nitrogen cycle gene expression to nitrogen fluxes from marine sediment mesocosms. *Frontiers in Microbiology* 5:429 (2014)
- Tait, K., Kitidis, V., Ward, B. B., Cummings, D. G., Jones, M. R., Somerfield P. J., Widdicombe, S. Spatio-temporal variability in ammonia oxidation and ammonia oxidising bacteria and archaea in coastal sediments of the Western English Channel. *Marine Ecology Progress Series* 511:41-58 (2014)
- Shilova, I. N., Robidart, J. C., Tripp, H. J., Turk-Kubo, K., Wawrik, B., Post, A. F., Thompson, A. W., Ward, B. B., Hollibaugh, J. T., Millard, A., Ostrowski, M., Scanlan, D., Paerl, R. W., Stuart, R., and Zehr, J. P. A microarray for assessing gene transcription from pelagic marine microbial taxa. *ISME-J* 8: 1476-1491 (2014)
- Chang, B. X., Rich, J. R., Jayakumar, A., Naik, H., Pratihary, A., Keil, R. G., Ward, B. B. and Devol, A. H. The effect of organic carbon on nitrogen loss in the oxygen deficient waters of the Eastern Tropical Pacific and Arabian Sea. *Limnology and Oceanography* 59: 1267-1274 (2014)
- Newell, S. E., Eveillard, D., McCarthy, M. J., Gardner, W. S., Liu, Z., and Ward, B. B. Ammonia oxidizing archaeal community composition in Gulf of Mexico sediments investigated with an *amoA* microarray. *Environmental Microbiology Reports*, 6:106-112 (2014)
- Babbin, A. R., R. Keil, A. H. Devol, and B. B. Ward. Organic matter stoichiometry, flux, and oxygen control nitrogen loss in the ocean. *Science* 344:406-408 (2014)
- Fawcett, S. E., Lomas, M. W., Ward, B. B. and Sigman, D. M. The counterintuitive effect of summer-to-fall mixed layer deepening on the eukaryotic new production in the Sargasso Sea. *Global Biogeochemical Cycles* 28 doi:10.1002/2013GB004579 (2014)
- Ward, B. B. Nitrification. In *Earth Systems and Environmental Sciences*. Elsevier <http://editorial.elsevier.com/app/book?execution=e2s3> (2013)
- Jayakumar, A., Peng, X. and Ward, B. B. Community composition of bacteria involved in fixed nitrogen loss in the water column of two major oxygen minimum zones in the ocean. *Aquatic Microbial Ecology* 70:245-259 (2013)
- Bowen, J. L., Kearns, P. J., Holcomb, M. and Ward, B. B. Acidification alters the community composition of ammonia oxidizing microbial assemblages in marine mesocosms. *Marine Ecology Progress Series* 492: 1-8 (2013)
- Francis, C. A., O'Mullan, G. D., Cornwell, J. C., and Ward, B. B. Transitions in *nirS*-type denitrifier diversity, community composition, and biogeochemical activity along the Chesapeake Bay Estuary. *Frontiers of Microbiology* doi: 10.3389/fmicb.2013.00237 (2013)
- Ward, B. B. How Nitrogen is Lost. *Science* 341:352-353 (2013)
- Peng, X., Jayakumar, A. and Ward, B. B. Community composition of ammonia-oxidizing archaea from surface and anoxic depths of oceanic oxygen minimum zones. *Frontiers of Microbiology* doi: 10.3389/fmicb.2013.00177 (2013)
- Newell, S. E., Fawcett, S. E. and Ward, B. B. Depth distribution of ammonia oxidation rates and ammonia-oxidizer community composition in the Sargasso Sea. *Limnology and Oceanography* 58:1491-1500 (2013)
- Babbin, A. R and B. B. Ward. Controls on nitrogen loss processes in Chesapeake Bay sediments. *Environmental Science and Technology* 47: 4189-4196 (2013)
- Voss, M., Bange, H. W., Dippner, J. W., Middelburg, J. J., Montoya, J. P. and Ward, B. B. The marine nitrogen cycle: Recent discoveries, uncertainties and the potential relevance of

- climate change. *Philosophical Transactions of the Royal Society B*. 368: 20130121 (2013)
- Ward, B. B. The Global Nitrogen Cycle. In: A. H. Knoll, D. E. Canfield and K. O. Konhauser, Editors, *Fundamentals of Geomicrobiology*, Wiley-Blackwell, Chichester, UK, Pp. 36-48 (2012)
- Jayakumar, A., Al-Rashaidat, M. M. D., Ward, B. B. and Mulholland, M. R. Diversity, distribution and expression of *nifH* genes in oxygen deficient waters of the Arabian Sea. *FEMS Microbial Ecology* 82:597-606 (2012)
- Kritee, K., Sigman, D. M., Granger, J., Ward, B. B., Jayakumar, A. and Deutsch, C. Reduced isotope fractionation by denitrification under conditions relevant to the ocean. *Geochimica Cosmochimica Acta*, 92:243-259 (2012)
- Moffett, J., C. B. Tuit and B. B. Ward. Chelator-induced inhibition of copper metalloenzymes in denitrifying bacteria. *Limnology and Oceanography*, 57:272-280 (2012)
- 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* 14:714-729, DOI: 10.1111/j.1462-2920.2011.02623.x (2012)
- Newell, S.E., Babbin, A. R., Jayakumar, A. and B.B. Ward. Ammonia oxidation rates and nitrification in the Arabian Sea. *Global Biogeochemical Cycles*, 25 GB4016, 2011 doi:10.1029/2010GB003940 (2011)
- Fawcett, S. E., M. W. Lomas, J. R. Casey, B. B. Ward and D. M. Sigman. Eukaryotes dominate new production in the Sargasso Sea. *Nature Geosciences*, 4: 717-722 (2011)
- Bhadury, P., B.K. Song 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)
- Starkenbourg, 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. Kirshstein, 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. Oligonucleotide 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 biogeochemical 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 microarray. *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 microarray 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 denitrifying 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 *Molecular Ecology of Aquatic Microbes*, 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 methyl fluoride 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)

RESEARCH CRUISES AND EXPEDITIONS

- 2023 Chief Scientist, R/V Roger Revelle, Eastern Tropical South Pacific, 33 days Nov-Dec.
- 2022 Project Director, R/V John Sharp, Chesapeake Bay, 11 days, Aug.
- 2021 Project Director, R/V John Sharp, Chesapeake Bay, 8 days, Aug.
- 2020 Project Director, R/V John Sharp, Chesapeake Bay, 6 days, Aug.
- 2019 Project Director, R/V John Sharp, Chesapeake Bay, 5 days, Oct.
- 2018 Chief Scientist, R/V Sally Ride, Eastern Tropical North Pacific, 35 days, Mar-Apr.
- 2016 Project Director, R/V John Sharp, Chesapeake Bay, 5 days, Jul.
- 2016 Project Director, R/V John Sharp, Chesapeake Bay, 5 days, Nov.
- 2014 Chief Scientist, R/V Endeavor, Subarctic North Atlantic, 27 days, May.
- 2013 Chief Scientist, R/V Endeavor, Subarctic North Atlantic, 27 days, Aug-Sep.
R/V N. B. Palmer, Eastern Tropical South Pacific, 35 days, Jun-Jul.
- 2012 R/V T. G. Thompson, Eastern Tropical North Pacific, 30 days, Mar-Apr.
Chief Scientist, R/V Atlantic Explorer, Bermuda, 4 days, Feb.
- 2012 R/V Atlantic Explorer, Bermuda, 5 days, Aug.
- 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.
Chief scientist, R/V Cape Henlopen, Sargasso Sea, 4 days, Oct, Chesapeake Bay, 3 days Oct.
- 2003 Chief scientist, R/V Cape Henlopen, Sargasso Sea, Chesapeake Bay, 3 days Apr, June, Oct.
- 2002 Chief scientist, R/V Cape Henlopen, Sargasso Sea, 4 days, Apr, Chesapeake Bay, 3 days Oct.
- 2001 Chief scientist, 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.

- 1978 R/V T. G. Thompson, DOE-sponsored Northwest Marine Sciences Group cruise, Northeastern Pacific Ocean, 21 days, July.
- R/V T. G. Thompson, DOE-sponsored Northwest Marine Sciences Group cruise, Northeastern Pacific Ocean, 7 days, May.
- 1977 R/V T. G. Thompson, DOE-sponsored Northwest Marine Sciences Group cruise, Northeastern Pacific Ocean, 7 days, March.
- 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.

LECTURES, SEMINARS AND PRESENTED PAPERS

- 2023 Department of Oceanography, University of Washington, Seattle, WA, May.
Invited Earth Day Symposium speaker
ASLO Aquatic Sciences Meeting, La Palma Majorca, June, session convenor and speaker
- 2022 Department of Earth System Science, Stanford University, Stanford, CA, January,
Invited Departmental Seminar Speaker, Virtual
Duke Kunshan University, China, April, AGU College of Fellows Invited Speaker, Virtual
Hofstra University, NY, November, AGU College of Fellows Invited Speaker, Virtual
- 2021 7th International Conference on Nitrification, July, Logan, Utah, Plenary Speaker, Virtual
AAAS Symposium Speaker, February, Virtual
- 2020 Department of Ecology, Environment and Plant Sciences, Stockholm University, Sweden, December, Invited Speaker, Virtual
Escuela de Ciencias del Mar, Pontificia Universidad Católica de Valparaíso, Chile, November, Invited Speaker, Virtual
- 2019 Princeton Energy and Climate Scholars, Princeton University, Princeton, NJ, December, Invited Speaker
6th International Conference on Nitrification, Xiamen, China, October, Plenary Speaker
Princeton Environmental Institute Seminar, Princeton University, Princeton, NJ, April, Invited Speaker
Swedish National Academy of Sciences, Deoxygenation symposium, Sweden, January, Invited Speaker
- 2018 Challenger Society, Newcastle, UK, September, Plenary speaker

- Ocean Deoxygenation Symposium, GEOMAR, Kiel, Germany, September,
Plenary Speaker
- 2017 5th International Conference on Nitrification, Vienna, Austria, invited speaker,
August
Departmental Seminar, invited speaker, MIT, December
- 2016 Invited Speaker and Symposium leader, International Symposium on Ocean
Deoxygenation; SCOR WG-144 and Symposium in honor of the
retirement of Professor Wajih Naqvi, Director National Institute of
Oceanography, Goa, India, December
Departmental Seminar, invited speaker, University of Wisconsin, November
Departmental Seminar, invited speaker, Johns Hopkins, October
Marie Tharp Lecturer, GEOMAR, Kiel, Germany, September
- 2015 International Symposium on Dynamics of the Indian Ocean: Perspective and
Retrospective, Goa, India, December
Charnock Lecture, Southampton Oceanography Center, UK, October
Goldschmidt Conference, Invited Keynote Lecture, Prague, August
Chemical Oceanography H. Burr Steinbach Lecture, WHOI, July
Departmental Seminar, invited speaker, WHOI, July
ASLO meeting, Plenary Speaker, Granada, Spain, March
- 2014 American Geophysical Union, Rachel Carson Award Lecture, December
Rutgers University, New Brunswick, NJ, USA, Selman A. Waksman Award
Lecture, April
- 2013 Harvard University, Boston, MA, USA, invited seminar, December
Universidad Catolico, Santiago, Chile, invited seminar, November
Universidad Concepcion, Concepcion, Chile, invited seminar, November
Rutgers University, New Brunswick, NJ, USA, invited seminar, November
University of Rhode Island, Narragansett, RI, USA, Charles and Marie Fish
Lecture in Oceanography, November
Plymouth Marine Laboratory, invited seminar, May
ASLO meeting, New Orleans, LA, invited speaker, February
- 2012 American Society for Microbiology, Proctor and Gamble Award speaker, June
University of Toronto, invited Symposium speaker, January
- 2011 Aspen Institute for Physics, Microenvironments Workshop, invited plenary
speaker, January
Lamont Doherty Earth Observatory, March, departmental seminar
Second International Conference on Nitrification, The Netherlands, July, invited
plenary speaker
Nereis Park Benthic Processes in a Globally Changing Environment,
Kristineberg, Sweden, August, invited plenary speaker

- Scripps Institution of Oceanography, San Diego, CA, November, Departmental seminar speaker
- 2010 ASLO meeting, Portland, OR, invited speaker, February
 University of Georgia, Department of Marine Science, Departmental Seminar speaker, March
 Gordon Conference Marine Microbial Ecology, invited speaker, July
 ISME (International Society for Microbial Ecology) Session Chair and invited symposium speaker, August
 Geotraces Scoping Workshop, Los Angeles, CA, invited speaker, November
 Plymouth Marine Laboratory, invited speaker, December
 Agricultural University of Sweden, Departmental Seminar, December
- 2009 Rutgers, Princeton Environmental Geochemistry seminar, May
 ASLO meeting, Nice, France, February, Session chair
 Plymouth Marine Laboratory, July, invited speaker
 First International Conference on Nitrification, Louisville, KY, July, invited speaker
 Agouron Nitrogen meeting, October, invited speaker
 Princeton, Departmental seminar, December
- 2008 International Symposium on Microbial Ecology, Cairns, August, speaker
 University of Maryland, Baltimore, May, departmental seminar
 EC-US Task Force on Biotechnology Research, Mallorca, June, invited speaker
 University of Cape Town, South Africa, Workshop on International Oceanographic collaboration, July, invited speaker
 Stroud Water Research Center, Avondale, PA, May, invited speaker
 Royal Netherlands Academy of Arts and Sciences Colloquium for International Census of Marine Microbes, Amsterdam, May, invited speaker
- 2007 ASLO meeting, Santa Fe, February, speaker
 Lamont Doherty Earth Observatory, March, departmental seminar
 Sequencing the Seas (NERC), London, May, invited speaker
 ASM meeting, Toronto, May, invited symposium speaker, symposium organizer
 Plymouth Marine Laboratory, July, invited speaker
- 2006 ASLO meeting, Hawaii, February, speaker, session chair
 Environmental Systems Microbiology Symposium, Georgia Institute of Technology, March, invited speaker
 SGM Symposium, Environmental Metagenomics, Warwick University, UK, April, invited speaker
 Sustained Indian Ocean Biogeochemical and Ecological Research (SIBER) Workshop, Goa, India, October, invited speaker
 Anthropogenic Nitrogen in the Marine Environment, SCOR workshop, Norwich, England, November, invited
 Old Dominion University, Norfolk, VA, December, invited

- Great Lakes Center for Research, Milwaukee, WI, November, invited
- 2005 ASLO meeting, Salt Lake City, February, invited speaker
 University of Oregon, May, invited seminar speaker
 UNC Wilmington, Marine Sciences/Department of Biology, May 2005, invited
 ASLO meeting, Santiago, Spain, June, special session speaker
 Significant Pathways, Observations and Transformation in Oceanic Nitrogen
 (SPOT-ON) Conference, Warnemunde, Germany, July, invited speaker
 Oceanic Carbon and Climate Change (OCCC) science meeting, Woods Hole,
 MA, August, invited speaker
 Brown University, Department of Ecology and Evolutionary Biology, September,
 invited seminar speaker
 Crary Science Laboratory, McMurdo Station Antarctica, December
- 2004 Agouon Institute Workshop on Marine Microbial Ecology, Del Mar, CA,
 January
 Arctic Microbiology conference, Rovaniemi, Finland, March, invited
 Marine and Freshwater Molecular Biology meeting, University of Norwich, UK,
 June, Plenary speaker
 Speaker, Gordon Conference in Bioinorganic Chemistry, Maine, July
 Departmental Seminar, Ecole Normale Superieure, Paris, France, July
 Departmental Seminar, Plymouth Marine Laboratory, Plymouth, UK, August
- 2003 ASLO meeting, Salt Lake City, February, Session Chair and Speaker
 Gothenburg University, Gothenburg, Denmark, Symposium on Alternative
 Pathways in Nitrogen Cycling, March, Invited Speaker
 Geobiology Course, Catalina Island (USC): "Function and Diversity in the
 Nitrogen Cycle," Symposium Speaker, July
 Teachers Experiencing Antarctica Workshop, American Museum of Natural
 History, NYC, July, Invited Speaker
- 2002 Cornell University, Biogeochemistry and Biocomplexity program, departmental
 seminar, October
 Rutgers University, Biochemistry and Microbiology Department, departmental
 seminar, November
 Plymouth Marine Laboratory, Plymouth UK, November
 Center for Ecology and Hydrology, Oxford University, Oxford UK, November
 Environmental Bioinorganic Chemistry Gordon Conference, June, Session Chair
 and Invited Speaker
 ASLO meeting, Hawaii, February, Session Chair and speaker
 AGU meeting San Francisco, December, Invited Speaker
- 2001 "Denitrification in an Antarctic lake: A role for trace metal regulation?" ASLO,
 Albuquerque, February.
 "Functional diversity in microbially mediated nitrogen cycling." Chemical
 Oceanography Gordon Conference, August.

- “Community structure and activity of AOB assemblages compared in the marine water column vs. intertidal sediments.” International Symposium on Microbial Ecology, Amsterdam, August.
 Biocomplexity of aquatic microbial systems: Relating diversity of microorganisms to ecosystem function.” NSF, October.
 “Methods limited, technology driven: A new age of discovery in aquatic environmental microbiology.” Biotechnology Center for Agriculture and the Environment, Rutgers University, October.
 "Functional diversity in microbially mediated nitrogen cycling." Georgia Institute of Technology, October.
- 2000 "Functional diversity of nitrification and denitrification." ASM, invited symposium, Los Angeles, May.
 "Nitrogen cycling in aquatic environments: Microbiological and biogeochemical advances in the study of nitrogen transformations. 7th European Marine Microbiology Symposium, invited symposium, The Netherlands, September.
 "Functional diversity of nitrification and denitrification." Florida State University, October.
 "Complexity and diversity in the marine nitrogen cycle." Princeton Environmental Institute, October.
 "Control of denitrification in a permanently ice-covered Antarctic lake: A role for bioactive trace metals?" McMurdo Station, Antarctica, November.
- 1999 "Molecular Microbial Ecology: The wave of the future in oceanographic exploration" Bigelow Laboratory for Ocean Sciences, 25th Anniversary Conference, June
 "Probing for Denitrification in Aquatic Systems." State University of New York, Stony Brook, October.
 “Probing for Denitrification in Aquatic Systems.” University of Delaware, Lewes, October.
- 1998 “Denitrification parameters in the Arabian Sea.” ASLO, San Diego, February.
 “Biogeochemistry and molecular ecology of nitrification and denitrification in aquatic environments.” Dauphin Island Marine Laboratory, Alabama, May.
 “Mystery of denitrification in a permanently ice-covered Antarctic Lake. Dauphin Island Marine Laboratory, Alabama, May.
 “Biogeochemistry and molecular ecology of nitrification and denitrification in aquatic environments.” University of California, Irvine, May.
- 1997 “Where does the nitrogen go? Tracer experiments in an enclosed planktonic system.” ASLO, Santa Fe, February.
 “Molecular ecology of nitrifying bacteria.” Departmental Seminar, Virginia Institute of Marine Sciences, Williamsburg, March.
 “Biogeochemistry and molecular ecology of the nitrogen cycle.” Departmental Seminar, Princeton University, April.

“Biogeochemistry and molecular ecology of the nitrogen cycle.” Oceanography Departmental Seminar, University of Washington, Seattle, May.

"Environmental regulation of biogeochemical nitrogen cycles and linkage to community diversity and composition." Applied and Environmental Microbiology Gordon Conference, July.

1996 “Nitrification and denitrification in aquatic and sediment environments: What we’ve learned about their biogeochemistry from molecular biology.” Skidaway Institution of Oceanography, Savannah, GA, January.

“Production and consumption of dissolved organic nitrogen by planktonic assemblages in coastal systems: Trophic implications from size fraction experiments.” ASLO/AGU San Diego, February.

“Nitrification and denitrification in the marine environment: What we’ve learned about their biogeochemistry from molecular biology.” Oceanography Departmental Seminar, Texas A&M University, March.

“Nitrification and denitrification in the marine environment: What we’ve learned about their biogeochemistry from molecular biology.” Biology Departmental Seminar, Woods Hole Oceanographic Institution, March.

“Redrawing the box model of the nitrogen cycle of surface waters.” General Seminar, Woods Hole Oceanographic Institution, March.

"Molecular microbial ecology of denitrification in marine environments." National Institute of Oceanography, Goa, India, November.

1995 “Detecting, characterizing and quantifying nitrifying and denitrifying bacteria in aquatic and sediment environments.” Marine Biology Departmental Seminar, Scripps Institution of Oceanography, October.

“Nitrification and ammonification in aquatic systems” NASA workshop on “Nitrogen dynamics in controlled systems,” Berkeley, September

“Detection and characterization of denitrifying bacteria from a permanently ice-covered Antarctic lake.” ASLO, Reno, June.

“Probing bacterial processes on oceanic to micro-scales.” MIT, March.

1994 "Functional and taxonomic probes for bacteria in the nitrogen cycle." Invited speaker, NATO ASI Workshop, Molecular Ecology of Aquatic Microbes, Italy, August.

"Probing the unusual nitrogen cycle of a permanently frozen Antarctic lake." Microbiology Department, Aberdeen University, Scotland, August.

"Probing the unusual nitrogen cycle of a permanently frozen Antarctic lake." Invited participant and speaker, Workshop on Molecular Microbial Ecology and Biosafety. Braunschweig, Germany, June.

"Probing the nitrogen cycle: Nitrification and Denitrification." Invited symposium speaker, ASM, Las Vegas, May.

"Microbial ecology of estuaries." Monterey Bay Marine Biological Symposium, Naval Post Graduate School, February.

- 1993 "Probes for bacteria in the marine nitrogen cycle." Gesellschaft für Biotechnologische Forschung mbH, Braunschweig, Germany, December.
- "Nitrification and denitrification in oxic/anoxic interface environments." Lehrstuhl für Mikrobiologie, Universität Karlsruhe, Karlsruhe, Germany, December.
- "Probes for bacterial processes in the nitrogen cycle of an Antarctic Lake." Max Planck Institute für Limnologie, Plön, Germany, November.
- "Transformation rates, species distributions and functional probes; complex pictures of the marine nitrogen cycle." Institute for Marine Research, Warnemuende, Germany, November.
- "Nitrification and denitrification in oxygen minimum zones." Department of Ecology and Genetics, Aarhus University, Aarhus, Denmark
- Rate processes, species distributions and function-specific probes for bacteria in the nitrogen cycle." Max Planck Institute für Marine Microbiology, Bremen, Germany, November.
- "Microbiology of nitrogen transformations in marine gradient ecosystems." American Society for Microbiology, Atlanta, May.
- "Marine microbiology and nitrogen cycling in interface environments." Microbiology Department, Auburn University, May.
- 1992 "Relationships between methane and ammonium oxidation in seawater." Invited departmental seminar, Soil Sciences Department, University of California, Berkeley, January.
- "Probes for denitrifying bacteria in marine systems and proposed use in Tomales Bay microbial mats." Marconi Conference Center (Tiburon Center, UCSF), March.
- "Nitrification leads to denitrification: Studies on the marine nitrogen cycle." Biology departmental seminar, Montana State University, Bozeman, March.
- "Probes for denitrifying bacteria in the marine environment." Invited departmental seminar, Oceanography Department, University of Washington, Seattle, May.
- "Bioremediation by microbial mats." ONR Workshop on Bioremediation, Seattle, June.
- "Genetic and immunological diversity of marine denitrifying bacteria." American Society for Microbiology, New Orleans, May.
- "Specific probes for denitrifying bacteria." Invited, ASLO, Santa Fe, February.
- 1991 "Methane oxidation at deep methane maxima in coastal California waters." Tenth International Symposium on Environmental Biogeochemistry, San Francisco, August.
- "Biotechnology applications in marine nitrogen cycle studies." National Institute of Oceanography, Goa, India, November.
- 1990 "Nitrification leads to denitrification: Studies on the marine nitrogen cycle." Rutgers University, New Brunswick, NJ, October.

- "Reaction kinetics in the real world: Nitrification and methane oxidation in marine systems." Oceanography departmental seminar, Old Dominion University, Norfolk, VA, October.
- "Relationship between ammonium and methane oxidation in a stratified fjord." Marine Sciences departmental seminar, University of California, Santa Cruz, May.
- "Nitrogen cycling in anoxic basins: The Black Sea and the Cariaco Trench." Oceanography departmental seminar, University of Washington, Seattle, March.
- "Reaction kinetics in the real world: Nitrification rates and V vs S." University of Washington, Seattle, March.
- Inorganic nitrogen "Transformations in the Black Sea." AGU/ASLO, February.
- 1989 "Inorganic nitrogen transformations in the oxic zone of the Black Sea." NATO Workshop on Black Sea Oceanography, Izmir, Turkey, October.
- "Relationship between substrate concentration and nitrification rates: Kinetics in the real world." Southern California Microbial Physiology Society, UC Riverside, April.
- "Dissolved methane in the Southern California Bight." Scripps Institution of Oceanography, March.
- 1988 "Biological nitrogen cycling in the nitracline." AGU, San Francisco, December.
- "Kinetics of ammonium and methane oxidation in pure cultures and natural populations." Horn Point Environmental Laboratory, May.
- "Chemoautotrophic CO₂ assimilation by nitrifying bacteria in marine systems: an enzymatic approach." Nitrification in Terrestrial and Aquatic Systems, an International Workshop organized by the Institute for Ecological Research, Arnhem, The Netherlands, April. (presented by H.E. Glover)
- "Nitrification and trace gases in oceanic systems." Nitrification in Terrestrial and Aquatic Systems, an International Workshop organized by the Institute for Ecological Research, Arnhem, The Netherlands, April.
- "Methane oxidation by marine nitrifying bacteria." University of California, Santa Cruz, February.
- 1988 "Methane oxidation and methane flux in Saanich Inlet during summer stratification." ASLO, New Orleans, January.
- "Relationship between ribosomal content and growth rate in a marine bacterium." ASLO, New Orleans, January. (presented by L.J. Kerkhof)
- 1987 "Methane oxidation by marine ammonia-oxidizing bacteria." 3rd European Marine Microbiology Symposium, Menai Bridge, Wales, September.
- "Nitrogen and carbon cycling by marine nitrifying bacteria." Scripps Institution of Oceanography, June.
- "Oceanic source of atmospheric methane estimated from in situ methane oxidation rates." American Chemical Society, Denver, April.
- "Relationships between methane and ammonia oxidation in seawater." American Society for Microbiology annual meeting, Atlanta, GA, March.

- 1986 "Methane oxidation in the marine water column." AGU, San Francisco, December.
 "Immunoaffinity column for separation of marine nitrifying bacterium." Invited. Immunochemical Methods in Estuarine, Coastal and Oceanographic Ecology, University of Southern Maine, Portland, October.
 "Kinetics of ammonium oxidation and methane oxidation by a marine nitrifying bacterium." Limnological Institute, University of Uppsala, Sweden, May.
 "Nitrification and nitric oxide in the oxygen minimum of the Eastern Tropical North Pacific." Botaniska Institutionen, Goteborgs Universitet, Sweden, May.
 "Nitrification and methane oxidation in the sea: Kinetic evidence for methylotrophic marine nitrifying bacteria." Marine Biological Association of the United Kingdom, Plymouth, England, April.
 "Nitrification and nitric oxide in the oxygen minimum of the eastern Tropical North Pacific." University College of North Wales, Menai Bridge, Wales, April.
 "Nitrification rates and nitric oxide in the oxygen minimum zone off Baja California." ASLO, New Orleans, January.
 "Bacteriological studies in the oxygen minimum off Peru." ASLO, New Orleans, January.
- 1985 "Nitrification in the Southern California Bight." Center for Great Lakes Studies, University of Wisconsin, Milwaukee, October.
- 1984 "Serological diversity of nitrifying bacteria and nitrification rates in the Southern California Bight." ASLO, San Francisco, December.
 Published Abstract, EOS, 65(45):920
 "Nitrogen oxidation and assimilation in the Southern California Bight." University of Texas, Port Aransas, April.
 "Environmental control of marine nitrification rates." ASLO, New Orleans, January. Published Abstract, EOS, 64(52):1075
- 1983 "Contributions of phytoplankton and nitrifying bacteria to nitrogen fluxes in coastal waters." Third International Symposium on Microbial Ecology, Michigan State University, East Lansing, August.
 "Contributions of phytoplankton and nitrifying bacteria to nitrogen cycling in coastal waters." University of California, Santa Barbara, May.
 "Nitrogen cycling in coastal waters off the coast of Washington." Woods Hole Oceanographic Institution, February.
- 1982 "Immunofluorescence for ecological study of individual bacterial species." Invited presentation, ASLO, San Francisco, December.
 [Published Abstract, EOS 63(45):958] "Autotrophic activity of marine nitrifying bacteria in the primary nitrite maximum of the coastal Northeast Pacific Ocean." ASLO, San Antonio, February.
- 1981 "Abundance and in situ activity of marine nitrifying bacteria."

American Society for Microbiology, Dallas, March. (Published Abstract of Annual Meeting of the American Society for Microbiology. Amer. Soc. Microbiol. Washington, D.C., p.180)

1980 "Marine nitrification: Estimates of in situ microbial activity." ASLO, Seattle, December. (with R.J. Olson).

1979 "An immunofluorescence assay for the enumeration of Nitrosococcus Oceanus" ASLO, Stony Brook, June. (with M.J. Perry).

SELECTED PROFESSIONAL ACTIVITIES / UNIVERSITY SERVICE

- 2023 8th International Conference on Nitrification (ICoN8), Organizer and Conference Host, Session Chair
- 2023 Final Public Oral Opponent, University of British Columbia, April
- 2023-present Graduate Work Committee, Department of Geosciences, Princeton University
- 2022 Final Public Oral Examiner, Virginia Institute of Marine Sciences, May
- 2021 7th International Conference on Nitrification (ICoN7), Organizing Committee, session chair, July
- 2021 Visiting Committee to review Earth and Planetary Sciences Department, Johns Hopkins University, November
- 2021 Search Committee, Princeton University Associate Vice President for Capital Projects
- 2020-2022 Chair, HMEI teaching postdoctoral fellows program and search committee
- 2020 Panel Member, Antarctic Program NSF, Committee of Visitors Review, April
- 2019 Visiting Committee to review Atmospheric and Ocean Sciences Ph.D. program, University of California, Los Angeles
- 2018-present PEI/HMEI Faculty Advisory Committee
- 2017-2019 Chair, PEI senior faculty search committee
- 2018-present University and Geoscience Building Committees (many)
- 2017 Visiting Committee to review Oceanography Ph.D. program, University of California, Santa Barbara
- 2016-2017 Committee on Promotion and Tenure, Princeton University
- 2016-Present Trustee, Bermuda Institute of Ocean Sciences
- 2016 Visiting Committee to review Georgia Tech, School of Earth and Environmental Sciences
- 2016-2018 Princeton University Task Force on the Environmental Sciences
- 2014 Visiting Committee to review MIT/WHOI Joint Program in Oceanography
- 2014-2015 Sir Alister Hardy Foundation for Ocean Sciences (SAHFOS) task force member
- 2014-2015 Princeton University Task Force on the future of the Natural Sciences
- 2014-2018 Chair SCOR working group chair, Deoxygenation in the Oceans
- 2013-2014 Princeton University President's Committee on the Grading Policy
- 2012-2015 Member, Decadal Survey of Ocean Sciences, National Academy of Sciences
- 2011-2015 TARA Oceans project, Science Advisory Board
- 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

2010-2022 Trustee, Plymouth Marine Laboratory

2008-2009 Member, President's Committee on Climate Science at Princeton, Princeton University

2006-2007 Committee on Promotion and Tenure, Princeton University

2006-2022 Chair, Department of Geosciences, 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 and International Conference on Nitrification, steering committee

2004 Discussion Leader, Picoplankton Gordon Conference, June
Special Sessions Chair, ASLO 2004 February meeting

2005-2022 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

1999 Chair, External Visiting Committee for the Biology Department, Woods Hole Oceanographic Institution
Discussion Leader, Gordon Conference on Applied and Environmental Microbiology: Global Processes, Microorganisms and Molecular Ecology

1998-2005 Member, Graduate Work Committee, Geosciences Department

1998 Special Sessions Program Chairman, ASLO99 Committee

1998 Steering Committee Member and invited participant, OUEVRE future of biological oceanography workshop sponsored by NSF

1997 Session Chairman, Nitrogen Transformations, ASLO, February
Discussion Leader, Applied and Environmental Microbiology Gordon Conference, July

1997 Panel Member, Office of Polar Programs, National Science Foundation

1997-1999 Subject Editor, Aquatic Microbial Ecology

1996-2005 Editorial Board Member, Microbial Ecology

1996-1998 Biological Oceanography representative, The Oceanography Society Council

1995-1998 Ocean Sciences Department Chair, UCSC

- 1995-1998 Member, Fleet Improvement Committee for UNOLS (University National Oceanographic Laboratory System)
- 1995-2006 Editorial Board Member, Global Change Biology journal
- 1994-1997 Member, US JGOFS Steering Committee
- 1993-1996 Nominations Chairperson, Sigma Xi, UCSC Chapter
- 1992-1995 Member at Large, ASLO
- 1992 Panel Member, Biological Oceanography, National Science Foundation, January
- 1990 - 1992 Member, Editorial Board, American Society for Limnology and Oceanography (ASLO)
- 1982-Present Reviewer for NSF Programs (Biological Oceanography, Chemical Oceanography, Small Business Initiative Research, Biological Instrumentation, etc.).
Reviewer for NASA, Sea Grant, NERC, etc. Programs.
- 1980-Present Reviewer for Journals (e.g., Limnology and Oceanography, Deep-Sea Research, Marine Chemistry, Marine Ecology-Progress Series, Science, Nature, Journal of Marine Research, ISME Journal, Water Research, and others).
- 1991 Session Chairman, "Metals, Organics, and Depositional Environments." International Symposium on Environmental Biogeochemistry, San Francisco, August
Member, National Scientific Committee for Tenth International Symposium on Environmental Biogeochemistry
Member, Indo-U.S. Working Group on Atmospheric and Marine Sciences, Delhi, India, November
- 1990 Panel Member, Biotechnology Fellowship Program, National Science Foundation, October.
Participant, Future directions for DOE-sponsored Oceanographic Research Workshop, June.
Working group member, Arctic System Science Workshop, JOI sponsored, March.
- 1989 Panel Member, Biotic Systems and Resources, National Science Foundation, May.
Panel Member, Biological/Chemical Oceanography, National Foundation, January.
- 1988 Session Chairman, AGU/ASLO, December.
Session Chairman, Workshop on Transfer of Biotechnology to Marine Sciences, September.
Panel Member, Biotic Systems and Resources, National Science Foundation, May.
- 1984 Session Chairman, AGU/ASLO, December.
- 1982 Session Chairman, AGO/ASLO, December.

CLASSROOM TEACHING (last five years)

Semester	Course Number	Course Name	Enrollment
Spring 2024	GEO202	Ocean, Atmosphere and Climate	45
Spring 2024	GEO505	Fundamentals of Geoscience	6 team taught

Fall 2023:	GEO 417	Environmental Microbiology	27
Spring 2022:	GEO 428	Biological Oceanography	11
Fall 2022:	GEO 506	Fundamentals of Geoscience	6 team taught
Spring 2021	GEO 417	Environmental Microbiology	13
Fall 2021	GEO 506	Fundamentals of Geosciences	6 Team taught
Spring 2020	GEO 428	Biological Oceanography	13
Fall 2020	GEO 506	Fundamentals of Geosciences	8 Team taught
Spring 2019	GEO 417	Environmental Microbiology	14
Fall 2019	GEO 506	Fundamentals of Geosciences	5 Team taught

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), Ph.D. 2012
 Andrew Babbin (Princeton), Ph.D. 2014
 Xuefeng Peng (Princeton), Ph.D. 2015
 Qixing Ji (Princeton), Ph.D. 2016
 Jessica Lueders-Dumont (Princeton), Ph.D. 2019
 Xin Sun (Princeton), Ph.D. 2020
 John Tracey (Princeton), Ph.D. 2022
 Julia Carroll (Princeton), M.S. 2019
 Naomi Intrator (Princeton) 2018 – present
 Jenna Lee (Princeton) 2019 – present
 Moriah Kunes (Princeton) 2020 – present
 Catherine Hexter (Princeton) 2022 – present

Thesis Advisor, Biology Masters Students (UCSC)

Robert Harding, M.S., 1998
 Brandon Carter, M.S., 1999

Thesis Advisor, Marine Sciences Masters Program Students (UCSC)

Don Bard, M.S., 1995
 Mary Hogan, M.S., 1995
 Deborah Smalheer, M.S., 1997
 Neil Harrington, M.S., 1999
 Icarus Solem, 2000

Postdoctoral Scholars:

Dr. Elizabeth Leon-Palmero, 2023 – present
Dr. Joseph Vineis, 2022 – 2024
Dr. Samantha Fortin, 2021 – present
Dr. Xianhui Wan, 2020 – 2024
Dr. Weiyi Tang, 2019 – 2024
Dr. Claudia Frey, 2016 – 2018
Dr. Sarah E. Fawcett, 2012 – 2015
Dr. Nicolas van Oostende, 2012 – 2018
Dr. Bonnie X. Chang, 2010 – 2013
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

Committee Member for the following Ph.D. Students:

Princeton Abigale Wyatt (GEO)
 Paridhi Rustogi (GEO)
 Gemma Sawell (GEO)
 Devan Nisson (GEO)
 Yeongjun Ryu (GEO)
 Eunah Han (GEO)
 Naomi Intrator (GEO)
 Zachary Garvin (GEO)
 Matt Lacerra (GEO)
 Patricia Brandt (EEB)
 Rachel Harris (GEO)
 Katje Luxem (GEO)
 Cara Magnabosco (GEO)
 Brandon Stackhouse (GEO)
 Jahnvi Punekar (GEO)

Farhan Narruzamann (GEO)
Johanna Goldman (GEO)
Kristen Karsh (GEO)
Dalin Shi (GEO)
Jenna Losh (GEO)
Kuan Huang (GEO)
Yan Xu (EEB)
Haewon Park (GEO)
Wei Jiang (GEO)
Mark Davidson (GEO)
Bianca Mislwak (GEO)
Sigel Abramovitch (GEO)
Alex Barron (EEB)
Eileen Ekstrom (CHEM ENG)
Eric Egleston (CHEM ENG)
Curtis Deutsch (AOS)
Meredith Galanter-Hastings (GEO)
Jenifer Kiesman (EEB)
Angela Knapp (GEO)
Phoebe Lam (GEO)
Li-Hung Lin (GEO)
Brian Mailleux (GEO)
Philippe Tortell (EEB)

UCSC

Jon Ashen
Katherine Courtney
Cristina Diaz
David Hutchins
Peter Miller
Debbie Moon
Angus Murphy
Mike Murrell
Michele Nishiguchi
Jonathon Phinney
Swarup Wood
Lief Abrell

Elsewhere

Alex Parker, University of Delaware, 2001
Yuko Sukano, Rutgers
Caroline Miller Solomon, Horn Point Laboratory, University of Maryland, 2006
Christopher Jones, Swedish University of Agricultural Sciences, Uppsala,
Sweden, 2010
Marshall Bowles, University of Georgia, 2010
Charles Schutt, University of Georgia, 2014
Vani Motit, Laval University, Canada, 2013
Jessica Lisa, Virginia Institute of Marine Sciences, 2015

David Capelle, University of British Columbia, 2016
Stephanie Wilson, Virginia Institute of Marine Sciences, 2022
Brett Jameson, University of British Columbia, 2023
Irene H. Zhang, MIT, 2023

Committee Member for the following Marine Sciences Masters Students (UCSC):

Khalil Abu-Saba
Graeme Haywood
Eric Millbrecht
Roman Marin
Susan Rose
Miranda Sanders
Patricia Smith
Kira Steinberg
Peter Walz

Senior Thesis Advisor

- Spring 1991 Gabriela Tobal: The Effect of Nitrous Oxide on Nitrate Reductase Activity in the Process of Denitrification in *Pseudomonas perfectomarina*.
Francine A. Stanton: Construction and Applications of Xyl E Probe for Detection of TOL+ Bacteria Strains in the Santa Cruz Harbor.
Cindy Smith MacConnell: The Diversity of Luminescent Bacterial Isolates from the Monterey Bay, Characterized through Nutritional Capabilities and Restriction Fragment Length Polymorphism.
- Fall 1991 Lara Hansen: The Effect of UVB Radiation on *Pseudomonas perfectomarina* in Simulated Surface Waters of Monterey Bay.
- Spring 1992 Christina De La Rocha: Tannin Tolerance in Bacteria isolated from the Guts of Herbivorous Marine Invertebrates and Fish.
- Spring 1994 Chris Francis: Quantitative Hybridization Method for Detection and Enumeration of the xylE Gene in a Microbial Mat Community.
Alisa Kirk: Depth Profile of Plasmid DNA Extracted from the Microbial Mats of Elkhorn Slough.
- Spring 1997 Jeremy Factor, Detection of ammonia monooxygenase and methane monooxygenase genes using the PCR.
L.C. Gorham: Endosulfan Residue in Sediments of Elkhorn Slough.
Julia Muldoon: Construction of a Gene Probe for the Detection of the 2,4-D Degrading Plasmid pJP4 in *A. eutrophus* JMP134.
Jan Purl: A Study of Zooplankton Fecal Pellet Contents as an Indicator of Variation in Diet.
- Spring 1998 Kiersten Ballard: Characterization of ammonia monooxygenase genes in nitrifying bacteria using PCR and sequence analysis.
Erin Osborne: Detection and quantification of gene fragments homologous with the tfbD gene for 2,4-D degradation in marine sediments

- Caroline Jenkins: Genetic diversity of functional genes in denitrifying bacteria investigated via PCR amplification of NiR gene in unidentified denitrifying bacterial isolates
- Spring 1999 Margaret Harrison: Biology of Doliolids (EEB)
- Spring 2002 Erin Griner: Optimization of microarray hybridization analysis for functional genes (CEM)
Katrina Jessoe: Diversity of *Synechococcus* and *Prochlorococcus* in the California Current Investigated by rpo-gene sequencing (EEB)
- Spring 2004 Evan Chyun: Real-time PCR quantification of nitrate transporter gene expression in diatoms (GEO)
- Spring 2007 Erin Lough: Diversity of microbial communities associated with Mediterranean shipwrecks (EEB)
- Spring 2010 Diana Chien (EEB): Phytoplankton Species Composition Investigated using functional Gene microarrays
- Spring 2012 Owen Coyle (GEO): A High-Definition Examination of Nitrogen Transformation in Marine Sediments
Alisa Tao (GEO): Sequence of Dissolved Inorganic Nitrogen Production During Denitrification by Marine Bacterial Strains
- Spring 2015 Martin Wolf (CBE): No Nitrification, No NO₃? The Importance of Nitrification in the Epipelagic North Atlantic
- Spring 2016 Sophia Myers (GEO): Regional variation in North Atlantic Bight baseline N isotopes and its relation to isotope signatures in fish otoliths
Atleigh Forden (GEO): Reconstructing fish ecology from otolith geochemistry: Past and present
Sunyoung Wang (CEE): Determination of key functional traits for environmentally important phytoplankton
- Spring 2018 Henry Ogilby (GEO): The role of encapsulin nanocompartments in anaerobic ammonium oxidation
Keo Chan (GEO): Nitrogen isotopic ($\delta^{15}\text{N}$) variation with fish length in the global ocean: a potential indicator for global anthropogenic impact
- Spring 2019 Katherine DuRussel (GEO): Estimating rates of anaerobic nitrite oxidation in the Eastern Tropical North Pacific oxygen minimum zone through incubation experiments
Yaakov Garfin (Mitch) Mitchell (GEO): *Prochlorococcus* and the secondary chlorophyll maximum in the eastern Tropical North Pacific oxygen deficient zone
- Spring 2020 Elizabeth Wallace (GEO): Retention and loss of fixed nitrogen in a Pacific oxygen minimum zone
- Spring 2021 Levy Nathan (GEO): Pathways of nitrous oxide production and consumption in Chesapeake Bay
William Ueberroth (GEO): Nitrous oxide database and global flux modeling
- Spring 2021 Samuel Cryan: Global distribution of SAR11 in marine metagenomes
Galen Cadley: Diversity, distribution and environmental preferences of nitrite oxidizing bacteria in the ETNP
- Spring 2022 Samuel Cryan: Presence and abundance of SAR-11 nar genes in oxygen minimum zones

Galen Cadley: Diversity, distribution and environmental preferences of nitrite oxidizing bacteria in the ETNP

Independent Study Advisor (UCSC)

Fall 1992 Kristy Paterson, Estimating Bacterial Production in Southern California Bight from the Simultaneous Incorporation of Thymidine and Leucine.

Junior Paper Advisor (Princeton)

Fall 1998 Kristin Coleman: Ancient DNA
Spring 1998 Hadley Owen: Sargasso Sea Thermocline
Fall 2002 Steven Andrews: Analysis of the Physical and Biological Structure of a Dynamic Estuary: A Transect of the Upper Chesapeake Bay
Evan Chyun: Anaerobic Toluene Metabolism by Halobenzoate-Degrading Denitrifying Bacteria
Spring 2003 Evan Chyun: Arsenite oxidase Genes in Bacteria from Various Aquatic Habitats
Spring 2006 Erin Lough: Fragment Length Analysis for Investigation of Microbial Diversity in Natural Waters
Fall 2008 Diana Chien: Phytoplankton community composition from microarray data compared to biogeochemical model predictions (EEB)
Spring 2009 Diana Chien: Phytoplankton Species Composition Investigated using functional Gene microarrays
Fall 2010 Owen Coyle: Stoichiometric Constraints on Nitrogen transformations: Interpreting Mesocosm Experimental Results
Fall 2011 Elisabeth Shouten: Regulation of the Denitrification Sequence by Marine Bacterial Strains
Spring 2014 Sean McIntee: Partitioning uptake of nitrogen among phytoplankton taxa in the North Atlantic
Spring 2015 Clair Zarakas: Spatial and Seasonal Variations in the Size Structure of North Atlantic Phytoplankton Assemblages
Sophia Myers: Nitrogen Isotopes in Fish Otoliths and their Intra-Organism Correlation
Fall 2015 Henry Ogilby: Phytoplankton community composition from functional gene microarrays
Jana Suriano: Determination of key functional traits for environmentally important phytoplankton species
Spring 2016 Keo Chan: Factors influencing carbon burial in Fjord Sediments
Fall 2018 Elizabeth Wallace: Depth and regional variation of nitrite oxidation rate in the Eastern Tropical North Pacific Oxygen Depleted Zone
Spring 2019 Elizabeth Wallace: Distribution and Diversity of Nitrous-Oxide-Consuming Bacteria in the Eastern Tropical North Pacific Oxygen Deficient Zone
Fall 2019 Levy Nathan: Ammonium, Nitrate, and Nitrite Distribution in the Water Column of the Chesapeake Bay

- Spring 2020 Levy Nathan: Investigating spatial and temporal patterns of water parameters in the Chesapeake Bay
- Fall 2020 Samuel Cryan: Global distribution of SAR11 in marine metagenomes
- Spring 2021 Samuel Cryan: Global distribution of SAR11 in marine metagenomes
Galen Cadley: Novel nitrite oxidizing bacteria found in the oxygen minimum zones of expanding OMZs
- Spring 2022 Isabel Rodriguez: Shifts in the geochemical composition of soils in the range of two contrasting hot springs at Yellowstone National Park