Curriculum Vitae
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Jonathan P. Zehr

Distinguished Professor Emeritus of Ocean Sciences
University of California, Santa Cruz

EMPLOYMENT HISTORY

2021-present	Distinguished Professor Emeritus of Ocean Sciences, University of California, Santa Cruz
2005-2020	Adjunct Scientist. Monterey Bay Aquarium Research Institute (MBARI)(unpaid)
2016-2017	Visiting Scholar (sabbatical) Stanford University (unpaid)
2003	Visiting Scientist, Department of Marine Microbiology, Netherlands Institute of Ecology NIOO-KNAW. Yerseke, The Netherlands (unpaid)
2014-2021	Distinguished Professor of Ocean Sciences, University of California, Santa Cruz
1999-2014	Professor of Ocean Sciences, University of California, Santa Cruz
1995-1999	Associate Professor of Biology, Rensselaer Polytechnic Institute
1993-1999	Associate Director, Darrin Fresh Water Institute, Rensselaer Polytechnic Institute
1992-1995	Assistant Professor of Biology, Rensselaer Polytechnic Institute
1987-1992	Research Assistant Professor, State University of New York, Stony Brook
1990	Visiting Scientist. National Institute for Basic Biology, Okazaki, Japan. Sponsor: Monbusho (Ministry of Education, Culture, and Science)
1988-1990	Postdoctoral Research Associate, New England Biolabs, Inc., Beverly, Massachusetts
1986-1988	Research Collaborator, Brookhaven National Laboratory, Upton, New York
1986	Postdoctoral Research Associate, State University of New York, Stony Brook, New York
1985-1986	National Research Council - USGS Research Associate, U.S. Geological Survey, Menlo Park, California
1983	Graduate Teaching Assistant, University of California, Davis, California
1981-1985	Graduate Research Assistant, University of California, Davis, California
1978-1981	Research Aide, Western Washington University, Bellingham, Washington

EDUCATION

1985	University of California-Davis, Davis, CA Ph.D. in Ecology-Limnology; Thesis Title: Dissolved Organic Nitrogen Dynamics and Bacterial Amino Acid Metabolism in Castle Lake, California. Advisor: Charles R. Goldman
1981	Western Washington University Bellingham, WA B.S. in Biology

HONORS AND AWARDS

Fellow, American Association for the Advancement of Science. 2019-present.
Cyanobacteria genus *Zehria* named in recognition of scientific contributions. 2019.
American Academy of Microbiology, 2009-present
Gordon and Betty Moore Investigator in Marine Microbiology, 2004-2014
National Research Council Research Associateship, 1985-86
National Science Foundation Predoctoral Fellowship, 1981-84
Outstanding Student in Biology, Western Washington University, 1981

PUBLICATIONS

Books

1. Zehr, J.P. & Capone, D.G.. 2021. Marine nitrogen fixation. Springer Nature. 186 p.

Book Chapters

1. Foster, R. A., T. A. Villareal, D. Lundin, J. B. Waterbury, E. A. Webb, and J. P. Zehr. 2022. *Richelia*, p. 1-17. Bergey's Manual of Systematics of Archaea and Bacteria. https://doi.org/10.1002/9781118960608.gbm01520
2. Zehr, J. P., R. A. Foster, J. Waterbury, and E. A. Webb. 2022. *Crocosphaera*, p. 1-9. Bergey's Manual of Systematics of Archaea and Bacteria. https://doi.org/10.1002/9781118960608.gbm01517
3. Webb, E. A., R. A. Foster, T. Villareal, J. B. Waterbury, and J. P. Zehr. 2022. *Trichodesmium*, p. 1-12. Bergey's Manual of Systematics of Archaea and Bacteria. https://doi.org/10.1002/9781118960608.gbm00448.pub2
4. Zehr, J.P., Caron, D.A. 2022. Symbiosis in the Ocean Microbiome. In: Stal, L.J., Cretoiu, M.S. (eds) The Marine Microbiome. The Microbiomes of Humans, Animals, Plants, and the Environment, vol 3. Springer, Cham. https://doi.org/10.1007/978-3-030-90383-1_13
5. Zehr, J.P. & Bombar, D. 2015. Marine nitrogen fixation: Organisms, significance, enigmas and future directions, Ch. 84. In: F.J. DeBruijn (ed.), Biological Nitrogen Fixation. Wiley-Blackwell. 1260 p.
6. Thompson, A.W., Bench, S. R., Carter, B. J. & Zehr, J. P. 2013. Coupling FACS and genomic methods for the characterization of uncultivated symbionts, p. 45-60. *In. E. F. Delong (ed.), Methods in Enzymology*, Vol. 531, Microbial Metagenomics, Metatranscriptomics, and Metaproteomics. Elsevier.
7. Shilova I., Thompson, A., Hewson, I. & Zehr, J. P. 2013. Metagenomics of Ocean Gyres. *In*:K. Nelson (ed.) Encyclopedia of Metagenomics: SpringerReference (www.springerreference.com). Springer-Verlag Berlin Heidelberg. DOI: 10.1007/SpringerReference_303294 2012-10-10 20:57:22 UTC
8. Robidart, J., Shilova, I. N. & Zehr, J. P. 2012. 'Omics'-enabled microbial sensors on ocean platforms, p 1-32. *In* S. M. Tiquia-Arashiro (ed.), Molecular Biological Technologies for Ocean Sensing. Humana Press, The University of Michigan-Dearborn, Dearborn, MI.
9. Zehr, J. P. & Paerl, H. W. 2008. Molecular ecological aspects of nitrogen fixation in the marine environment, p. 481-525. *In* D. L. Kirchman (ed.), Microbial ecology of the oceans. 2nd Edition. Wiley-Liss, Inc, Durham, NC.
10. Karl, D. M., Bidigare, R. R., Church, M. J., Dore, J. E., Letelier, R. M., Mahaffey, C. & Zehr, J. P. 2008. The nitrogen cycle in the North Pacific trades biome: An evolving

paradigm, p. 705-769. *In* D. G. Capone, D. A. Bronk, M. R. Mulholland and E. J. Carpenter (ed.), Nitrogen in the Marine Environment, Academic Press, New York, NY.

11. Jenkins, B. D. & Zehr, J. P. 2008. Molecular approaches to the nitrogen cycle, p. 1303-1329. *In*, D. G. Capone, D. A. Bronk, M. R. Mulholland and E. J. Carpenter (ed.), Nitrogen in the Marine Environment, Academic Press, New York, NY.
12. Stal, L. J. & Zehr, J. P. 2008. Cyanobacterial nitrogen fixation in the ocean: diversity, regulation and ecology, p. 423-446. *In* A. Herrero, E. Flores (ed.), The cyanobacteria: molecular biology, genomics and evolution. Caister Academic Press, Norfolk, UK.
13. Zehr, J. P. & Montoya, J. P. 2007. Measuring N_2 fixation in the field, p. 193-205. *In,* H. Bothe, S. Ferguson, and W. E. Newton (ed.), Biology of the nitrogen cycle. Elsevier B.V., Amsterdam, The Netherlands.
14. Zehr, J. P., Church, M. J. & Moisander, P. H. 2006. Diversity, distribution and biogeochemical significance of nitrogen-fixing microorganisms in anoxic and suboxic ocean environments, p. 337-369. *In* L. Neretin (ed.), Past and present water column anoxia. NATO Science Series. Springer, Dordrecht, The Netherlands.
15. Zehr, J. P., Methé, B. A. & Foster, R. 2005. New nitrogen-fixing microorganisms from the oceans: biological aspects and global implications, p. 361-365. *In* Y. P. Wang, M. Lin, Z. X. Tian, C. Elmerich, W. E. Newton (ed.), Biological nitrogen fixation, sustainable agriculture and the environment. Proceedings of the 14th International Nitrogen Fixation Congress. Current plant science and biotechnology in agriculture. Springer, Dordrecht, The Netherlands.
16. Short, S. M. & Zehr, J. P. 2005. Quantitative analysis of *nifH* genes and transcripts from aquatic environments, p. 380-394. *In* J. Leadbetter (ed.), Methods in enzymology: environmental microbiology. Elsevier B.V., Amsterdam, The Netherlands.
17. Zehr, J. P. & Capone, D. G. 2002. Nitrogen fixation in the marine environment, p. 2211-2221. *In* G. Bitton (ed.), Encyclopedia of environmental microbiology. John Wiley & Sons, London, UK.
18. Zehr, J. P. & Turner, P. J. 2001. Nitrogen fixation: nitrogenase genes and gene expression, p. 271-286. *In* J. H. Paul (ed.), Methods in microbiology: marine microbiology . Academic Press, London.
19. Ehrlich, H. L., Oremland, R. S. & Zehr, J. P. 2001. Biogeochemical cycles, p. 1-10. *In* Encyclopedia of life sciences. John Wiley & Sons, Ltd., London, UK.
20. Zehr, J. P. & Capone, D. G. 2000. Oceanic nitrogen fixation: Ecology and molecular biology of *Trichodesmium,* a marine diazotroph*,* p. 15-31. *In* E. W. Triplett (ed.), Prokaryotic nitrogen fixation: a model system for the analysis of a biological process. Horizon Scientific Press, Wymondham, UK.
21. Paerl, H. W. & Zehr, J. P. 2000. Marine nitrogen fixation, p. 387-426. *In* D. L. Kirchman (ed.), Microbial ecology of the oceans. Wiley-Liss, Inc., New York, NY.
22. Zehr, J. P. & Voytek, M. 1999. Molecular ecology of aquatic communities: reflections and future directions, p. 288. *In* J. P Zehr and M. Voytek (ed.), Hydrobiologia/Developments in Hydrobiologia, Volume 138. Kluwer Publishers, Amsterdam, The Netherlands.
23. Zehr, J. P., Dominic, B,. Chen, Y. B., Mellon, M. & Meeks, J. C. 1999. Nitrogen fixation in the marine cyanobacterium *Trichodesmium*: a challenging model for ecology and molecular biology, p. 485-500. *In* G. A. Peschek, W. Löffelhardt, and G. Schmetterer (ed.), The phototrophic prokaryotes. Kluwer Academic/Plenum Publishers, New York, NY.

24. Zehr, J. P. & Hiorns, W. 1998. Molecular approaches to studies of the activities of marine organisms, p. 91-112. *In* K. E. Cooksey (ed.), Molecular approaches to the study of the ocean, Chapman and Hall, London, UK.
25. Zehr, J. P. & Paerl, H. W. 1998. Nitrogen fixation in the marine environment: genetic potential and nitrogenase expression., p. 285-301. *In* K. E. Cooksey (ed.), Molecular approaches to the study of the ocean, Chapman and Hall, London, UK.
26. Zehr, J. P. 1995. Nitrogen fixation in the sea: Why only *Trichodesmium*? , p. 335-364. *In* I. Joint (ed.), Molecular ecology of aquatic microbes, NATO ASI Series, Vol. G. 38, Springer Verlag, Berlin.
27. Ohki, K., Zehr, J. P. & Fujita, Y.. 1992. *Trichodesmium*: Establishment of culture and characteristics of N_2-fixation, p. 307-318. *In* Marine pelagic cyanobacteria: *Trichodesmium* and other diazotrophs, E. J. Carpenter, D. G. Capone, and J. G. Rueter (ed.), Kluwer Academic Publishers, Dordrecht, The Netherlands.
28. Zehr, J. P. 1992. Molecular biology of nitrogen fixation in natural populations of marine cyanobacteria, p. 249-264. *In* E. J. Carpenter, D. G. Capone, and J. G. Rueter (ed.), Marine pelagic cyanobacteria *Trichodesmium* and other diazotrophs, Kluwer Academic Publishers, Dordrecht, The Netherlands.

Book Review

29. Zehr, J. P. 2012. Review of "Nitrogen Cycling in Bacteria: Molecular Analysis" . James Moir (ed.). Caister Academic Press, Norwich, United Kingdom, 2011, 250 p. Microbe. March.

Journal Articles

1. Coale, T. H., Loconte, V., Turk-Kubo, K. A., Vanslembrouck, B., Mak, W. K. E., Cheung, S., Ekman, A., Chen, J.-H., Hagino, K., Takano, Y., Nishimura, T., Adachi, M., Le Gros, M., Larabell, C., & Zehr, J. P. (2024). Nitrogen-fixing organelle in a marine alga. Science, 384(6692), 217-222. doi:10.1126/science.adk1075
2. Kramer, B. J., Turk-Kubo, K., Zehr, J. P., & Gobler, C. J. (2024). Intensification of harmful cyanobacterial blooms in a eutrophic, temperate lake caused by nitrogen, temperature, and CO_2. Science of the Total Environment, 915, 169885. doi:https://doi.org/10.1016/j.scitotenv.2024.169885
3. Moore, L. R., Caspi, R., Campbell, D. A., Casey, J. R., Crevecoeur, S., Lea-Smith, D. J., Long, B., Omar, N. M., Paley, S. M., Schmelling, N. M., Torrado, A., Zehr, J. P., & Karp, P. D. (2024). CyanoCyc cyanobacterial web portal. Frontiers in Microbiology, 15. Retrieved from https://www.frontiersin.org/journals/microbiology/articles/10.3389/fmicb.2024.1340413
4. Dutkiewicz, S., Follett, C. L., Follows, M. J., Henderikx-Freitas, F., Ribalet, F., Gradoville, M. R., Coesel, S. N., Farnelid, H., Finkel, Z. V., Irwin, A. J., Jahn, O., Karl, D. M., Mattern, J. P., White, A. E., Zehr, J. P., & Armbrust, E. V. (2024). Multiple biotic interactions establish phytoplankton community structure across environmental gradients. Limnology and Oceanography, n/a(n/a). doi:https://doi.org/10.1002/lno.12555
5. Cornejo-Castillo, F. M., Inomura, K., Zehr, J. P., & Follows, M. J. (2022). Metabolic tradeoffs constrain the cell size ratio in a nitrogen-fixing organelle-like symbiosis. 187(7), 1762-1768.E1769. doi:10.1016/j.cell.2024.02.016

6. Zehr, J. P., & Riemann, L. (2023). Quantification of gene copy numbers is valuable in marine microbial ecology: A comment to Meiler et al. (2022). Limnology and Oceanography, 68(6), 1406–1412. doi:10.1002/lno.12364
7. Zehr, J. P., & Capone, D. G. (2023). Unsolved mysteries in marine nitrogen fixation. Trends in Microbiology. doi:10.1016/j.tim.2023.08.004
8. Turk-Kubo, K. A., Henke, B. A., Gradoville, M. R., Magasin, J. D., Church, M. J., & Zehr, J. P. (2023). Seasonal and spatial patterns in diazotroph community composition at Station ALOHA. Frontiers in Marine Science, 10. doi:10.3389/fmars.2023.1130158
9. Salas, K., Cabello, A. M., Turk-Kubo, K. A., Zehr, J. P., & Cornejo-Castillo, F. M. (2023). Primer design for the amplification of the ammonium transporter genes from the uncultured haptophyte algal species symbiotic with the marine nitrogen-fixing cyanobacterium UCYN-A1. Frontiers in Microbiology, 14. doi:10.3389/fmicb.2023.1130695
10. Salamon Slater, E. R., Turk-Kubo, K. A., Hallstrøm, S., Kesy, K., Laas, P., Magasin, J., Zehr, J. P., Labrenz, M., & Riemann, L. (2023). Composition and distribution of diazotrophs in the Baltic Sea. Estuarine, Coastal and Shelf Science, 294, 108527. doi:10.1016/j.ecss.2023.108527
11. Dugenne, M., Gradoville, M. R., Church, M. J., Wilson, S. T., Sheyn, U., Harke, M. J., Björkman, K. M., Hawco, N. J., Hynes, A., M., Ribalet, F., Karl, D. M., DeLong, E. F., Dyhrman, S. T., Armbrust, E. V., John, S., Eppley, J. M, Harding, K., Stewart, B., Cabello, A. M., Turk-Kubo, K. A., Caffin, M., White, A. E. & Zehr, J. P. 2023. Nitrogen fixation in mesoscale eddies of the North Pacific Subtropical Gyre: patterns and mechanisms. Global Biogeochemical Cycles.
12. Muñoz-Marín, M. d. C., Magasin, J.D & Zehr, J;.P. 2023. Open ocean and coastal strains of the N_2-fixing cyanobacterium UCYN-A have distinct transcriptomes. PLoS. bioRxiv 2022.07.26.501530; doi: https://doi.org/10.1101/2022.07.26.501530
13. Harding, K. J., Turk-Kubo, K. A., Mak, E. W. K., Weber, P. K., Mayali, X., & Zehr, J. P. (2022). Cell-specific measurements show nitrogen fixation by particle-attached putative non-cyanobacterial diazotrophs in the North Pacific Subtropical Gyre. Nature Communications, 13(1). doi:10.1038/s41467-022-34585-y
14. Gradoville M.R., Dugenne ,M., Hynes A.M., Zehr J.P., & White, A.E. 2022. Empirical relationship between *nifH* gene abundance and diazotroph cell concentration in the north Pacific subtropical gyre. J Phycol. doi: 10.1111/jpy.13289. Epub ahead of print. PMID: 36266252.
15. Turk-Kubo, K. A., Gradoville, M. R., Cheung, S., Cornejo-Castillo, F. M., Harding, K. J., Morando, M., Mills, M., & Zehr, J. P. (2022). Non-cyanobacterial diazotrophs: global diversity, distribution, ecophysiology, and activity in marine waters. FEMS Microbiology Reviews, 47(6). doi:10.1093/femsre/fuac046
16. Chen, C.-C., Rodriguez, I.B., Chen, Y.-l.L., Zehr, J.P., Chen, Y.-R., Hsu, S.-T.D., Yang, S.-C. & Ho, T.-Y. 2022. Nickel superoxide dismutase protects nitrogen fixation in *Trichodesmium*. Limnol. Oceanogr. Lett, 7: 363-371. https://doi.org/10.1002/lol2.10263
17. Cheung, S., Liu, K., Turk-Kubo, K.A., Nishioka, J., Suzuki, K., Landry, M.R., Zehr, J.P., Leung, S., Deng, L. & Liu, H. 2022. High biomass turnover rates of endosymbiotic nitrogen-fixing cyanobacteria in the western Bering Sea. Limnol. Oceanogr. Lett. https://doi.org/10.1002/lol2.10267
18. Schvarcz, C. R., Wilson, S. T., Caffin, M., Stancheva, R., Li, Q., Turk-Kubo, K. A., White, A. E., Karl, D. M., Zehr, J. P., & Steward, G. F. (2022). Overlooked and

widespread pennate diatom-diazotroph symbioses in the sea. Nature Communications, 13(1). doi:10.1038/s41467-022-28065-6
19. Muratore, D., Boysen, A. K., Harke, M. J., Becker, K. W., Casey, J. R., Coesel, S. N., Mende, D. R., Wilson, S. T., Aylward, F. O., Eppley, J. M., Vislova, A., Peng, S., Rodriguez-Gonzalez, R. A., Beckett, S. J., Virginia Armbrust, E., DeLong, E. F., Karl, D. M., White, A. E., Zehr, J. P., Van Mooy, B. A. S., Dyhrman, S. T., Ingalls, A. E., & Weitz, J. S. (2022). Complex marine microbial communities partition metabolism of scarce resources over the diel cycle. Nature Ecology & Evolution, 6(2), 218–229. doi:10.1038/s41559-021-01606-w
20. Dextro RB, Delbaje E, Cotta SR, Zehr JP, Fiore MF. 2021. Trends in Free-access Genomic Data Accelerate Advances in Cyanobacteria Taxonomy. J Phycol. 2021 Oct;57(5):1392-1402. doi: 10.1111/jpy.13200.
21. Turk-Kubo, K. A., Mills, M. M., Arrigo, K. R., van Dijken, G., Henke, B. A., Stewart, B., Wilson, S. T., & Zehr, J. P. (2021). UCYN-A/haptophyte symbioses dominate N2 fixation in the Southern California Current System. ISME Communications, 1(1). doi:10.1038/s43705-021-00039-7
22. Gradoville, M.R., Cabello, A.M., Wilson, S.T., Turk-Kubo, K.A., Karl, D.M. and Zehr, J.P. 2021. Light and depth dependency of nitrogen fixation by the non-photosynthetic, symbiotic cyanobacterium UCYN-A. Environ Microbiol, 23: 4518-4531. https://doi.org/10.1111/1462-2920.15645
23. Cheung, S., Zehr, J.P., Xia, X., Tsurumoto, C., Endo, H., Nakaoka, S.-i., Mak, W., Suzuki, K. and Liu, H. 2021. Gamma4: a genetically versatile Gammaproteobacterial *nifH* phylotype that is widely distributed in the North Pacific Ocean. Environ Microbiol, 23: 4246-4259. https://doi.org/10.1111/1462-2920.15604
24. Sarkar, D., Landa, M., Bandyopadhyay, A., Pakrasi, H B., Zehr, J. P. & Maranas, C.D. 2021. Elucidation of trophic interactions in an unusual single-cell nitrogen-fixing symbiosis using metabolic modeling. PLoS Comp. Biol. doi: 10.1371/journal.pcbi.1008983
25. Landa, M., Turk-Kubo, K.A., Cornejo-Castillo, F. M., Henke ,B. A.,& Zehr J. P. 2021. Critical role of light in the growth and activity of the marine N_2-fixing UCYN-A symbiosis. Front.Microbiol. 12.doi: 10.3389/fmicb.2021.666739
26. Farnelid, H., Turk-Kubo, K. & Zehr, J.P. 2021. Cell sorting reveals few novel prokaryote and photosynthetic picoeukaryote associations in the oligotrophic ocean. Environ. Microbiol. 23: 1469-1480. Doi: 10.1111/1462-2920.15351.
27. Cornejo-Castillo, F.M. & Zehr, J.P. 2021. Intriguing size distribution of the uncultured and globally widespread marine non-cyanobacterial diazotroph Gamma-A. ISME J **15**, 124–128. doi: 10.1038/s41396-020-00765-1.
28. Garcia-Pichel, F., Zehr, J.P., Bhattacharya, D. & Pakrasi, H.B. (2020), What's in a name? The case of cyanobacteria. J. Phycol., 56: 1-5. https://doi.org/10.1111/jpy.12934
29. Cabello, A.M., Turk-Kubo, K.A., Hayashi, K., Jacobs, L., Kudela, R.M. & Zehr, J.P. 2020. Unexpected presence of the nitrogen-fixing symbiotic cyanobacterium UCYN-A in Monterey Bay, California. J. Phycol., 56: 1521-1533. https://doi.org/10.1111/jpy.13045
30. Mills, M. M., Turk-Kubo, K. A., van Dijken, G. L., Henke, B. A., Harding, K., Wilson, S. T., Arrigo, K. R., & Zehr, J. P. (2020). Unusual marine cyanobacteria/haptophyte symbiosis relies on N_2 fixation even in N-rich environments. The ISME Journal, 14(10), 2395–2406. doi:10.1038/s41396-020-0691-6

31. Gradoville, M.R., Farnelid, H., White, A.E., Turk-Kubo, K.A., Stewart, B., Ribalet, F., Ferrón, S., Pinedo-Gonzalez, P., Armbrust, E.V., Karl, D.M., John, S. & Zehr, J.P. (2020), Latitudinal constraints on the abundance and activity of the cyanobacterium UCYN-A and other marine diazotrophs in the North Pacific. Limnol Oceanogr, 65: 1858-1875. https://doi.org/10.1002/lno.11423
32. Zehr, J. P. & Capone, D. G. 2020. Changing perspectives in marine nitrogen fixation. Science. 368 (6492). doi: 10.1126/science.aay9514.
33. Shilova, I. N., Magasin, J. D., Mills, M. M., Robidart, J. C., Turk-Kubo, K. A., & Zehr, J. P. 2020. Phytoplankton transcriptomic and physiological responses to fixed nitrogen in the California current system. PLos One.doi: 0.1371/journal.pone.0231771
34. Cornejo-Castillo FM, Zehr JP. 2019. Hopanoid lipids may facilitate aerobic nitrogen fixation in the ocean. Proc Natl Acad Sci U S A. 116(37):18269-18271. doi: 10.1073/pnas.1908165116.
35. Wilson, S. T., Hawco, N. J., Armbrust, E.V., Barone, B., et al. 2019. Kīlauea lava fuels phytoplankton bloom in the North Pacific Ocean. Science. 6;365(6457):1040-1044. doi: 10.1126/science.aax4767.
36. Foster, R. A., and J. P. Zehr. 2019. Diversity, genomics, and distribution of phytoplankton-cyanobacterium single-cell symbiotic associations. Annual Review of Microbiology 73: 435-456. 10.1146/annurev-micro-090817-062650
37. Moreira-Coello, V., Mouriño-Carballido, Marañon,E., Fernández-Carrera, A., Boda, A., Sintes, A., Zehr, J. P., Turk-Kubo, K., & Varella, M. M. 2019. Temporal variability of diazotroph community composition in the upwelling region off NW Iberia. Scientific Reports. 9:3737 doi.org/10.1038/s41598-019-39586-4
38. Farnelid, H., Turk-Kubo, K. A., Ploug, H., Ossolinski, J. E., Collins, J. R., Van Mooy, B.A.S., & Zehr, J. P. 2019. Diverse diazotrophs are present on sinking particles in the North Pacific Subtropical Gyre. The ISME Journal 13: 170-182
39. Cornejo-Castillo, F. M., Maria del Carmen, H., Acinas, S.G., & Zehr, J. P. 2019. UCYN-A3, a newly characterized open ocean sublineage of the symbiotic N_2-fixing cyanobacterium *Candidatus* Atelocyanobacterium thalassa. Environmental Microbiology 21(1):111-124
40. Harding, K., Turk-Kubo, K. A., Sipler, R. E., Mills, M. M., Bronk, D.A & Zehr, J. P. 2018. Symbiotic unicellular cyanobacteria fix nitrogen in the Arctic Ocean. Proceedings of the National Academy of Sciences 115 (52), 13371-13375
41. Robidart, J. C., Magasin, J.D., Shilova, I.N. Turk-Kubo, K.A., Wilson, S. T., Karl, D. M., Scholin, C. A. & Zehr, J.P. 2019. Effects of nutrient enrichment on surface microbial community gene expression in the oligotrophic North Pacific Subtropical Gyre. The ISME Journal 13(2): 374-387. doi: 10.1038/s41396-018-0280-0.
42. Muñoz-Marín, M. D. C., Shilova, I.N., Shi, T., Farnelid, H., Cabello, A. M. & Zehr, J. P. 2019. The transcriptional cycle is suited to daytime N_2 fixation in the unicellular cyanobacterium *Candidatus* Atelocyanobacterium thalassa (UCYN-A). mBio 10, e02495–18
43. Harke, M. J., Frischkorn, K.R., Haley, S.T., Aylward, F. O., Zehr, J.P. & Dyhrman, S. T. 2019. Periodic and coordinated gene expression between a diazotroph and its diatom host. The ISME Journal 13, 118–131.
44. Pereira, N., Shilova, I.N. & Zehr, J.P. 2019. Use of the high-affinity phosphate transporter gene, *pstS*, as an indicator for phosphorus stress in the marine diazotroph

Crocosphaera watsonii (*Chroococcales*, *Cyanobacteria*). J. Phycol., 55: 752-761. https://doi.org/10.1111/jpy.12863
45. Henke, B. A., Turk-Kubo, K. A., Bonnet, S. & Zehr, J. P. 2018. Distributions and abundances of sublineages of the N_2-fixing cyanobacterium *Candidatus* Atelocyanobacterium thalassa (UCYN-A) in the New Caledonian coral lagoon. Frontiers in Microbiology 9, 554 doi: 10.3389/fmicb.2018.00554
46. Turk-Kubo, K. A., Connell, P., Caron, D., Hogan, M. E., Farnelid, H. M., & Zehr, J. P. 2018. In situ diazotroph population dynamics under different resource ratios in the North Pacific Subtropical Gyre.Frontiers in microbiology 9: 1616 doi: 10.3389/fmicb.2018.01616
47. Shilova, I.N., Mills, M. M., Robidart, J. C., Turk-Kubo, K. A., Björkman, K. M., Kolber,Z., Rapp, I., Van Dijken, G.L., Church, M. J., Arrigo, K.R., Achterberg, E.P., & Zehr, J. P. 2017. Differential effects of nitrate, ammonium, and urea as N sources for microbial communities in the North Pacific Ocean. Limnology and Oceanography 62: 2550-2574
48. Gradoville, M. R., Bombar, D., Crump, B.C., Letelier, R. M., Zehr, J. P., & White, A.E. 2017.Diversity and activity of nitrogen-fixing communities across ocean basins. Limnology and Oceanography 62: 1895-1909
49. Zehr, J.P., Weitz, J. & Joint, I. 2017. How microbes survive in the open ocean. Science 357 (6352), 646-647. doi: 10.1126/science.aan5764
50. Wilson, S. T., Aylward, F. O., Ribalet, F., Barone, B., Casey, J. R., Connell, P. E., Eppley, J. M., Ferrón, Fitzsimmons, J. N., Hayes, C. T., Romano, A. E., Turk-Kubo, K. A., Vislova, A., Armbrust, E. V., Caron, D. A., Church, M. J., Zehr, J. P., Karl, D. M. & DeLong, E. F. 2017. Coordinated regulation of growth, activity and transcription in natural populations of the unicellular nitrogen-fixing cyanobacterium *Crocosphaera*. Nature Microbiology. doi:10.1038/nmicrobiol.2017.118
51. Shilova, I. N., Mills, M.M., Robidart, J.C., Turk-Kubo, K., Björkman, K.M., Kolber, Z., Rapp I., van Dijken, G.L., Church, M.J., Arrigo, K.R., Achterberg, E.P., & Zehr, J. P. 2017. Differential effects of nitrate, ammonium and urea as N sources for microbial communities in the North Pacific Ocean. Limnology and Oceanography. doi: 10.1002/lno.10590
52. Gradoville, M. R., Bombar, D., Crump, B. C., Letelier, R. M., Zehr, J. P. & White, A. E. 2017. Diversity and activity of nitrogen-fixing communities across ocean basins. Limnology and Oceanography. doi: 10.1002/lno.10542
53. Bottjer, D., Dore, J.E., Karl, D.M., Letelier, R. M., Mahaffey, C., Wilson, S.T., Zehr, J., & Church, M. J. 2017. Temporal variability in nitrogen fixation and particulate nitrogen export at Station ALOHA. Limnology and Oceanography 62 (1), 200-216.
54. Rees, A. P., Turk-Kubo, K.A., Al-Moosawi, L, Alliouane, S., Gazeau, F., Hogan, M. & Zehr, J. P. 2017. Ocean acidification impacts on nitrogen fixation in the coastal western Mediterranean Sea. Estuarine, Coastal and Shelf Science. 186, 45-57
55. Turk-Kubo, K.A., Farnelid, H.M., Shilova, I.N., Henke, B. & Zehr, J.P. 2017. Distinct ecological niches of marine symbiotic N_2-fixing cyanobacterium *Candidatus* Atelocyanobacterium thalassa sublineages. Journal of Phycology. 53 (2), 451-461. 10.1111/jpy.12505
56. Fernández-Méndez, M., Turk-Kubo, K.A., Buttigieg, P.L., Rapp, J.Z., Krumpen, T., Zehr, J.P. & Boetius, A. 2016. Diazotroph diversity in the sea ice, melt ponds, and

surface waters of the Eurasian Basin of the Central Arctic Ocean. Frontiers in microbiology. doi.org/10.3389/fmicb.2016.01884

57. Zehr, J. P. Shilova, I., Muñoz-Marín, M. d. C. & Turk-Kubo, K. A. 2016. Unusual marine unicellular symbiosis with the nitrogen-fixing cyanobacterium UCYN-A. Nature Microbiology. doi:10.1038/nmicrobiol.2016.214 (Also an erratum because Nature mis-spelled an author's name)
58. Frank, I., Turk-Kubo, K.A. & Zehr, J.P. 2016. Rapid annotation of *nifH* gene sequences using Classification and Regression Trees (CART) facilitates environmental functional gene analysis. Environmental Microbiology Reports. 8 (5), 905-916
59. Farnelid, H., Turk-Kubo, K., Muñoz-Marín, M. d. C. & Zehr, J. P. 2016. New insights into the ecology of the globally significant uncultured nitrogen-fixing symbiont UCYN-A. Aquatic Microbial Ecology. 77 (3), 125-138
60. Shilova, I. N., Robidart, J.C., Delong, E.F. & Zehr, J. P. 2016. Genetic diversity affects the daily transcriptional oscillations of marine microbial populations. PLoS ONE 11(1): e0146706. doi:10.1371/journal.pone.0146706
61. Farnelid, H., Turk-Kubo, K. A. & Zehr, J. P. 2016. Identification of associations between bacterioplankton and photosynthetic picoeukaryotes in coastal waters. Frontiers in Microbiology DOI=10.3389/fmicb.2016.00339
62. Hilton. J. A., Meeks, J. C. & Zehr, J.P. 2016. Surveying DNA elements within functional genes of heterocyst-forming cyanobacteria. PLoS ONE 11 (5): e0156034. doi:10.1371/journal.pone.0156034.
63. Pereira, N., Shilova, I. N. & Zehr, J. P. 2016. Molecular markers define different degrees of phosphorus limitation in a nitrogen-fixing cyanobacterium *Crocosphaera*. Journal of Phycology 52:274-282.
64. Cornejo-Castillo, F. M., Cabello, A. M., Salazar, G., Sanchez-Baracaldo, P., Lima-Mendez, G., Hingcamp, P. , Alberti, A., Suagawa, S., Bork, P., de Vargas, C., Raes, J., Bowler, C., Wincher P., Zehr, J. P., Gasol, J. M., Massana R. & Acinas, S. G.. 2016. Cyanobacterial symbionts diverged in the late Cretaceous towards lineage-specific nitrogen fixation factories in single-celled phytoplankton. Nature Communications 7:11071 doi:10.1038/ncomms11071
65. Bench, S., Frank, I., Robidart, J. & Zehr, J. P. 2016. Two subpopulations of *Crocosphaera watsonii* have distinct distributions in the North and South Pacific. Environmental Microbiology. 18: 514-524. DOI: 10.1111/1462-2920.13180
66. Zehr, J. P. 2015. How single cells work together. Science 349:1146. DOI: 10.1126/science.aac9752
67. Wilson, S. T., Barone1, B., Ascani. F., Bidigare, R.R., Church, M.J., del Valle, D. A., Sonya T. Dyhrman, S. T., Ferrón, S., Fitzsimmons, J. N., Juranek, L. W., Kolber, Z. S., Letelier, R. M., Sandra Martínez-Garcia, S. , Nicholson, D. P., Richards, K. J., Rii, Y. M., Rouco, M., Viviani, D. A., A. E. White, A. E., J. P. Zehr, J. P. & Karl, D. M. 2015. Short-term variability in euphotic zone biogeochemistry and primary productivity at 1 Station ALOHA: A case study of summer 2012. Global Biogeochemical Cycles 29. 10.1002/2015GB005141
68. Turk-Kubo, K. A., Frank, I. E., Hogan, M. E., Desnues, A., Bonnet, S. & Zehr, J. P. 2015. Diazotroph community succession during the VAHINE mesocosms experiment (New Caledonia Lagoon). Biogeosciences Discussions 12 (12).
69. Bombar, D., Taylor, C., Wilson, S., Robidart, J. & Zehr, J. P. 2015. Measurement of in-situ N_2 fixation in the North Pacific Subtropical Gyre by means of an autonomous, free-

drifting submersible incubation device. J. Plankton Research 37: 727-739. doi:10.1093/plankt/fbv049

70. Varaljay, V. A., Robidart, J., Preston, C. M., Gifford, S. M., Durham, B. P., Burns, J. A.S., Ryan, P., Marin III, R., Kiene, R. P., Zehr, J. P., Scholin, C. A. & Moran, M. A. 2015. Single-taxon field measurements of bacterial gene regulation controlling DMSP fate. ISME Journal. 9:1677-1686. doi: 10.1038/ismej.2015.23
71. Hilton, J. A., Crump, B., Doherty, M., Moran, M. A., Paul, J. H., Satinsky, B. & Zehr, J. P. 2015. Metatranscriptomics of N_2-fixing cyanobacteria in the Amazon River Plume. The ISME Journal. 9: 1557-1569. doi: 10.1038/ismej.2014.240
72. Bombar, D., Heller, P., Sanchez-Baracaldo, P., Carter, B. J. & Zehr, J. P. 2014. Comparative genomics reveals surprising divergence of two closely related strains of uncultivated UCYN-A cyanobacteria. ISME J. 8:2530-42. doi:10.1038/ismej.2014.167.
73. Heller, P., Tripp, H. J., Turk-Kubo, K. & Zehr, J. P. 2014. ARBitrator: a software pipeline for on-demand retrieval of auto-curated *nifH* sequences from GenBank. Bioinformatics, doi:10.1093/bioinformatics/btu417 (2014).
74. Moisander, P. H., Serros, T., Paerl, R. W., Beinart, R. A. & Zehr, J P. 2014. Gammaproteobacterial diazotrophs and *nifH* gene expression in surface waters of the South Pacific Ocean. ISME J. 8: 1962-1973. doi:10.1038/ismej.2014.49.
75. Collavino, M.M, Tripp, H. J., Frank, I. E., Vidoz, M. L., Calderoli, P. A., Donato, M., Zehr, J. P. & Aguilar, O. M.. 2014. Aguilar. *nifH* pyrosequencing reveals the potential for location-specific soil chemistry to influence N_2-fixing community dynamics. Environmental Microbiology. 16: 3211-23. doi: 10.1111/1462-2920.12423
76. Thompson, A., Carter, B. J. , Turk-Kubo, K. , Malfatti, F., Azam, F. & Zehr, J. P. 2014. Genetic diversity of the unicellular nitrogen-fixing cyanobacteria UCYN-A and its prymnesiophyte host. Environmental Microbiology 16:3238-3249. doi: 10.1111/1462-2920.12490
77. Robidart, J., Church, M., Ryan, J., Wilson, S., Ascani, F., Marin, R. Richards, K., Karl, D., Scholin, C. & Zehr, J. P. 2014. Ecogenomic sensor reveals controls on N_2-fixing microorganisms in the North Pacific Ocean. ISME Journal. 8: 1175-1185. doi: 10.1038/ismej.2013.244.
78. Shilova, I. N., Robidart, J., Tripp, H. J., Thompson, A., Wawrik, B., Tozzi, S., Turk, K., Paerl, R., Heller, P. Magasin, J., Belcaid, M., Smit, M., Post, A., Hollibaugh, J. T., Jenkins, B., LaRoche, J., Millard, A., Simon, H., Stuart, R., Wurch, L., Chapell, D., Collier, J., Francis, C., Mosier, A., Gifford, S., Grote, J. & Zehr, J. P. 2014. Development and application of a microarray for assessing gene expression in open ocean microbial communities. ISME J. 8: 1476-1491. doi: 10.1038/ismej.2014.1.
79. Mansergh, S. & Zehr, J. P. 2014. *Vibrio* diversity and dynamics in the Monterey Bay upwelling region. Frontiers in Microbiology. doi: 10.3389/fmicb.2014.00048
80. Bonnet, S., Dekaezemacker, J., Turk-Kubo, K. A., Moutin, T., Hamersley, M. R., Grosso, O., Zehr, J. P. & Capone, D. G. 2013. Aphotic N_2 fixation in the Eastern Tropical South Pacific Ocean. PLoS ONE 8(12): e81265. doi:10.1371/journal.pone.0081265
81. Turk-Kubo, K. A., Karamchandani, M., Capone, D. G. & Zehr, J. P. 2014. The paradox of marine heterotrophic nitrogen fixation: Abundances of heterotrophic diazotrophs do not account for nitrogen fixation rates in the Eastern Tropical South Pacific. *Environmental Microbiology.* 16:3095-3114. doi*:* 10.1111/1462-2920.12346

82. Goebel, N. L., Edwards, C. A., Follows, M. & Zehr, J. P. 2013. Modeled diversity effects on microbial ecosystem functions of primary production, nutrient uptake, and remineralization. Ecology. doi: 10.1890/13-0421.1
83. Wilson, S. T., del Valle, D. A., Robidart, J. C., Zehr, J. P. & Karl, D. M. 2013. Dissolved hydrogen and nitrogen fixation in the oligotrophic North Pacific Subtropical Gyre. Environmental Microbiology Reports. 5:622-777. doi:10.1111/1758-2229.12069
84. Thompson, A. & Zehr, J.P. 2013. Cellular interactions: lessons from the nitrogen-fixing cyanobacteria. Journal of Phycology. 49: 1024-1035. (Invited minireview) doi: 10.1111/jpy.12117
85. Bench, S. R., Heller, P., Frank, I., Arciniega, M., Shilova, I. N. & Zehr, J. P. 2013. Whole genome comparison of six *Crocosphaera watsonii* strains with differing phenotypes. Journal of Phycology 49(4):786-801. doi: 10.1111/jpy.12090
86. Goebel, N. L., Edwards, C. A., Zehr, J. P., Follows, M. & Morgan, S. G. 2013. Modeled phytoplankton diversity and productivity in the California Current System. Ecological Modeling. 264: 37-47. http://dx.doi.org/10.1016/j.ecolmodel.2012.11.008
87. Ortiz-Marquez, J. C. F., Do Nascimento, M., Zehr, J. P. & Curatti, L. 2013. Genetic engineering of multi-species microbial cell-factories as an alternative for bioenergy production. Trends in Biotechnology. 31:521-529. doi: 10.1016/j.tibtech.2013.05.006
88. Bombar, D., Turk-Kubo, K. A., Robidart, J., Carter, B. J. & Zehr, J. P. 2013. Non-cyanobacterial *nifH* phylotypes in the North Pacific Subtropical Gyre detected by flow-cytometry cell sorting. Environmental Microbiology Reports. 5: 705-715. doi: 10.1111/1758-2229.12070
89. Zehr, J. P. 2013. Interactions with partners are key for oceanic nitrogen-fixing cyanobacteria. Microbe 8: 117-122.
90. Hilton, J. A., Foster, R. A., Tripp, H. J., Carter, B. J., Zehr, J. P. & Villareal, T. A. 2013. Genomic deletions disrupt nitrogen metabolism pathways of a cyanobacterial diatom symbiont. Nature Communications 4:1767 doi:10.1038/ncomms2748**.**
91. Bhattacharya, D., Graham, M., Grossman, A. & Zehr, J. 2012. Letter from the Editors. Journal of Phycology 48(4): 839-839
92. Turk-Kubo K. A., Achilles, K. M., Serros, T. R. C., Ochiai, M., Montoya, J. P. & Zehr, J. P. 2012. Nitrogenase (*nifH*) gene expression in diazotrophic cyanobacteria in the Tropical North Atlantic in response to nutrient amendments. Frontiers in Aquatic Microbiology. 3:386. doi: 10.3389/fmicb.2012.00386.
93. Thompson, A., Foster, R. A., Krupke, A., Carter, B. J., Nusat, N., Vaulot, D., Kuypers, M. M. M. & Zehr, J. P. 2012. Unicellular cyanobacterium symbiotic with a single-celled eukaryotic alga. *Science.* 337: 1546-1550.
94. Mulholland, M., Bernhardt, P. W., Blanco-Garcia, J. L., Mannino, A., Hyde, K., Mondragon, E. A., Turk, K. A., Moisander, P. H. & Zehr, J. P. 2012. Rates of dinitrogen fixation and the abundance of diazotrophs in North American coastal waters between Cape Hatteras and Georges Bank. Limnol. Oceanogr. 57(4):1067-1083.
95. Luo, Y., Doney, S. C., Anderson, L. A., Benavides**,** M., Bode, A., Bonnet, S., Boström, K. H., Böttjer, D., Capone, D. G., Carpenter, E. J., Chen, Y. L., Church, M. J., Dore, J. E., Falcón, L. I., Fernández, A., Foster, R. A., Furuya, K., Gómez, F., Gundersen, K., Hynes, A. M., Karl, D. M., Kitajima, S., Langlois, R. J., LaRoche, J., Letelier, R. M., Marañón, E., McGillicuddy Jr., D. J., Moisander, P. H., Moore, C. M., Mouriño-Carballido, B., Mulholland, M. R., Needoba, J. A., Orcutt, K.M., Poulton, A. J., Raimbault, P., Rees, A. P., Riemann, L, Shiozaki, T., Subramaniam, A. Tyrrell, T., Turk-

Kubo, K. A., Varela, M., Villareal, T. A., Webb, E. A., White, A. E., Wu, J., & Zehr, J. P. 2012. Database of diazotrophs in global ocean: abundances, biomass and nitrogen fixation rates, *Earth System Science Data* 4:47-73.

96. Paerl, R. W., Tozzi, S., Kolber, Z. S. & Zehr, J. P. 2012. Variation in the abundance of *Synechococcus sp.* CC9311 *narB* mRNA relative to changes in light, nitrogen growth conditions and nitrate assimilation. Journal of Phycology 48(4):1028-1039.
97. Wilson, S. T., Kolber, Z. S., Tozzi, S., Zehr, J. P. & Karl, D. M. 2012. Nitrogen fixation, hydrogen cycling, and electron transport kinetics in *Trichodesmium erythraeum* (Cyanobacteria) Strain IMS101. Journal of Phycology 48(3):595-606.
98. Paerl, R. W., Turk, K. A., Beinart, R., Chavez, F. P. & Zehr, J. P. 2012. Seasonal change in the abundance of *Synechococcus* and multiple distinct phylotypes in Monterey Bay determined by *rbcL* and *narB* quantitative PCR. Environ. Microbiol. 14(3):580-593.
99. Robidart, J., Preston, C. M., Paerl, R. W., Turk, K. A., Mosier, A. C., Francis, C. A., Scholin, C. A. & Zehr, J. P. 2012. Seasonal *Synechococcus* and *Thaumarchaeal* population dynamics examined with high resolution remote *in situ* instrumentation. ISME J. 6:513-523; doi:10.1038/ismej.2011.127
100. Moisander P. H., Zhang, R., Boyle, E. A., Hewson, I., Montoya, J. P. & Zehr, J. P. 2012. Analogous nutrient limitations in unicellular diazotrophs and *Prochlorococcus* in the South Pacific Ocean. ISME J. 6:733-744.
101. Bench, S. R., Ilikchyan, I. N., Tripp, H. J. & Zehr, J. P. 2011. Two strains of *Crocosphaera watsonii* with highly conserved genomes are distinguished by strain-specific features. Front. Microbio. **2:**261. doi: 10.3389/fmicb.2011.00261
102. Sohm, J. A., Hilton, J. A., Noble, A. E., Zehr, J. P., Saito, M. A. & Webb, E. A. 2011. Nitrogen fixation in the South Atlantic Gyre and Benguela Upwelling System. Geophys. Res. Lett. 38:L16608; doi:10.1029/2011GL048315
103. Tripp, H. J., Hewson, I., Boyarsky, S., Stuart, J. & Zehr, J. P. 2011. Misannotations of rRNA can now generate 90% false positive protein matches in metatranscriptomic studies. Nucleic Acids Res 39(20):8792-8802; doi: 10.1093/nar/gkr576
104. Preston, C. M., Harris, A., Ryan, J. P., Roman, B., Marin III, R., Jensen, S., Everlove, C., Birch, J., Dzenitis, J. M., Pargett, D., Adachi, M., Turk, K., Zehr, J. P. & Scholin, C. A. 2011. Underwater application of quantitative PCR on an ocean mooring. PloS ONE 6(8):e22522 doi:10.1371/journal.pone.0022522
105. Demir-Hilton, E., Sudek, S., Cuvelier, M. L., Gentemann, C. L., Zehr, J. P. & Worden, A. Z. 2011. Global distribution patterns of distinct clades of the photosynthetic picoeukaryote *Ostreococcus*. ISME J. **5**:1095-1107.
106. Hamersley, M. R., Turk, K. A., Leinweber, A., Gruber, N., Zehr, J. P., Gunderson, T. & Capone, D. G. 2011. Nitrogen fixation within the water column associated with two hypoxic basins within the Southern California Bight. Aquat. Microb. Ecol. 63:193-205.
107. Foster, R. A., Kuypers, M. M. M., Vagner, T., Paerl, R. W., Musat, N. & Zehr, J. P. 2011. Nitrogen fixation and transfer in open ocean diatom-cyanobacterial symbioses. ISME J. 5:1484-1493 doi:10.1038/ismej.2011.26
108. Zehr, J. P., Robidart, J. & Scholin, C. 2011. Marine microorganisms, biogeochemical cycles, and global climate change. Microbe. 6(4):169-175.
109. Bombar, D., Moisander, P. H., Dippner, J. W., Foster, R. A., Voss, M., Karfeld, B. & Zehr, J. P. 2011. Distribution of diazotrophic microorganisms and *nifH* gene expression in the Mekong River Plume during intermonsoon. Mar. Ecol. Prog. Ser. 424:39-52.
110. Zehr, J. P. 2011. Nitrogen fixation by marine cyanobacteria. Trends Microbiol.

19(4):162-173.
111. Turk, K., Rees, A. P., Zehr, J. P., Pereira, N. A., Swift, P., Shelley, R., Lohan, M., Woodward, E. M. S. & Gilbert, J. 2011. Nitrogen fixation and nitrogenase (*nifH*) expression in tropical waters of the eastern North Atlantic. ISME J. 5(7):1201-1212
112. Paerl, R. W., Johnson, K. S., Welsh, R. M., Worden, A. Z., Chavez, F. P. & Zehr, J. P. 2011. Differential distributions of *Synechococcus* subgroups across the California Current System. Front. Aquat. Microb. 2**:**59. doi: 10.3389/fmicb.2011.00059
113. Zehr, J. P. & Kudela, R. M. 2011. Nitrogen cycle of the open ocean: from genes to ecosystems. Annu. Rev. Mar Sci. 3:197-225.
114. Zehr J. P. 2010. Microbes in Earth's aqueous environments. *Front. Microbio.* 1:4. doi: 10.3389/fmicb.2010.00004
115. Goebel, N. L., Edwards, C. A., Zehr, J. P. & Follows, M. J. 2010. An emergent community ecosystem model applied to the California Current System. J. Mar. Syst. 83:221-241
116. Foster, R. A., Goebel, N. L. & Zehr, J. P. 2010. Isolation of *Calothrix rhizosoleniae* (Cyanobacteria) strain SC01from *Chaetoceros* (Bacillariophyta) spp. diatoms of the subtropical north Pacific Ocean. J. Phycol. 46:1028-1037.
117. Wilson S. T., Tozzi, S., Foster, R. A., Ilikchyan, I., Kolber, Z. S., Zehr, J. P. & Karl D. M. 2010. Hydrogen cycling by the unicellular marine diazotroph *Crocosphaera watsonii* strain WH8501. Appl Environ Microbiol. 76(20):6797-6803.
118. Goebel, N. L., Turk, K. A., Achilles, K. M., Paerl, R. W., Hewson, I., Morrison, A. E., Montoya, J. P., Edwards, C. A. & Zehr, J. P. 2010. Abundance and distribution of major groups of diazotrophic cyanobacteria and their potential contribution to N_2 fixation in the tropical Atlantic Ocean. Environ. Microbiol. 12(12):3272-3289.
119. Bothe, H., Tripp, H. J. & Zehr, J. P. 2010. Unicellular cyanobacteria with a new mode of life: the lack of photosynthetic oxygen evolution allows nitrogen fixation to proceed. Arch. Microbiol. 192:783-790.
120. Pennebaker, K., Mackey, K. R. M., Smith, R. M., Williams, S. B. & Zehr, J. P. 2010. Diel cycling of DNA staining and *nifH* gene regulation in the unicellular cyanobacterium *Crocosphaera watsonii* Strain WH8501 (Cyanophyta). Environ. Microbiol. 12(4):1001-1010.
121. Hewson, I., Poretsky, R. S., Tripp, H. J., Montoya, J. P. & Zehr, J. P. 2010. Spatial patterns and light-driven variation of microbial population gene expression in surface waters of the oligotrophic open ocean. Environ. Microbiol. 12(7):1940-1956.
122. Wilson, S. T., Foster, R. A., Zehr, J. P. & Karl, D. M. 2010. Hydrogen production by *Trichodesmium erythraeum*, *Cyanothece sp.* and *Crocosphaera watsonii*. Aq. Microb. Ecol. 59:197-206.
123. Moisander, P. H., Beinart, R. A., Hewson, I., White, A. E., Johnson, K. S., Carlson, C. A., Montoya, J. P. & Zehr, J. P. 2010. Unicellular cyanobacterial distributions broaden the oceanic N_2 fixation domain. Science 327(5972):1512-1514.
124. Tripp, H. J., Bench, S., Turk, K., Foster, R. A., Desany, B., Niazi, F., Affourtit, J. P. & Zehr, J. P. 2010. Metabolic streamlining in an open ocean nitrogen-fixing cyanobacterium. Nature 464**:**90-94.
125. Shi, T., Ilikchyan, I., Rabouille, S. & Zehr, J. P. 2010. Genome-wide analysis of diel gene expression in the unicellular N_2-fixing cyanobacterium *Crocosphaera watsonii* WH 8501. ISME J. 4:621-632.
126. Zehr, J. P. & Kudela, R. M. 2009. Photosynthesis in the open ocean. Science. 326:945-

946.

127. Hewson, I., Paerl, R. W., Tripp, H. J., Zehr, J. P. & Karl, D. M. 2009. Metagenomic potential of microbial assemblages in the surface waters of the central Pacific Ocean tracks variability in oceanic habitat. Limnol. Oceanogr. 54:1981-1994.
128. Zehr, J. P. 2009. New twist on nitrogen cycling in oceanic oxygen minimum zones. Proc. Natl. Acad. Sci. USA. 106(12):4575-4576.
129. Zehr, J. P. 2009. From microbes to global environmental change: thinking big about small things. Environ. Microbiol. Reports. 1:24-26.
130. Church, M. J., Mahaffey, C., Letelier, R. M., Lukas, R., Zehr, J. P. & Karl, D. M. 2009. Physical forcing of nitrogen fixation and diazotroph community structure in the North Pacific subtropical gyre. Global Biogeochem. Cy. 23:GB2020. doi:10.1029/2008GB003418.
131. Hewson, I., Poretsky, R., Dyhrman, S. T., Zielinski, B., White, A. E., Tripp, H. J., Montoya, J. P. & Zehr, J. P. 2009. Microbial community gene expression within colonies of the diazotroph, *Trichodesmium*, from the Southwest Pacific Ocean. ISME J. 3:1286-1300.
132. Hewson, I., Poretsky, R. , Beinart, R., White, A., Shi, T., Bench, S. R., Moisander, P. H., Paerl, R. W., Tripp, H. J., Montoya, J. P., Moran, M. A. & Zehr, J. P. 2009. *In situ* transcriptomic analysis of the globally important keystone N_2-fixing taxon *Crocosphaera watsonii*. ISME J. 3:618-631.
133. Poretsky, R., Hewson, I., Sun, S., Allen, A. E., Zehr, J. P. & Moran, M. A. 2009. Comparative day/night metatranscriptomic analysis of microbial communities in the North Pacific subtropical gyre. Environ. Microbiol. 11(6):1358-1375.
134. Ilikchyan, I. N., McKay, R. M., Zehr, J. P., Dyhrman, S. T. & Bullerjahn, G. S.. 2009. Detection and expression of the phosphonate transporter gene *phnD* in marine and freshwater picocyanobacteria. Environ. Microbiol. 11(5):1314-1324.
135. Foster, R. A., Paytan, A. & Zehr, J. P. 2009. Seasonality of N_2 fixation and *nifH* gene diversity in the Gulf of Aqaba (Red Sea). Limnol. Oceanogr. 54(1):219-233.
136. Zehr, J. P., Hewson, I. & Moisander, P. H. 2009. Molecular biology techniques and applications for ocean sensing. Ocean Sci. 5:101-113.
137. Foster, R. A., Subramaniam, A. & Zehr, J. P. 2009. Distribution and activity of diazotrophs in the Eastern Equatorial Atlantic. Environ. Microbiol. 11(4):741-750.
138. Moisander, P. H., Paerl, H. W. & Zeh, J. P.. 2008. Effects of inorganic nitrogen on taxa-specific cyanobacterial growth and *nifH* expression in a subtropical estuary. Limnol. Oceanogr. **53**(6):2519-2532.
139. Zehr, J. P., Bench, S. R., Carter, B. J., Hewson, I., Niazi, F., Shi, T., Tripp, H. J. & Affourtit, J. P. 2008. Globally distributed uncultivated oceanic N_2-fixing cyanobacteria lack oxygenic photosystem II. Science. 322:1110-1112.
140. Paerl, R. W., Foster, R. A., Jenkins, B. D., Montoya, J. P. & Zehr, J. P. 2008. Phylogenetic diversity of cyanobacterial *narB* genes from various marine habitats. Environ. Microbiol. 10(12): 3377-3387.
141. Goebel, N. L., Edwards, C. A., Carter, B. J., Achilles, K. M. & Zehr, J. P. 2008. Growth and carbon content of three different sized diazotrophic cyanobacteria observed in the subtropical North Pacific. J. Phycol. 44(5):1212-1220.
142. Moisander, P. H., Beinart, R. A., Voss, M. & Zehr, J. P. 2008. Diversity and abundance of diazotrophic microorganisms in the South China Sea during intermonsoon. ISME J. 2(6): 254-267.

143. Fong, A. A., Karl, D. M., Lukas, R., Letelier, R. M., Zehr, J. P. & Church, M. J. 2008. Nitrogen fixation in an anticyclonic eddy in the oligotrophic North Pacific Ocean. ISME J. 2:663-676.
144. Church, M. J., Bjorkman, K. M., Karl, D. M., Saito, M. A. & Zehr, J. P. 2008. Regional distributions of nitrogen-fixing bacteria in the Pacific Ocean. Limnol. Oceanogr. 53(1):63-77.
145. Bonnet, S., Guieu, C., Bruyant, F., Prasil, O., van Wambeke, F. O., Raimbault, P., Moutin, T., Grob, C., Gorbunov, M. Y., Zehr, J. P., Masquelier, S. M., Garczareck, L. & Claustre, H. 2008. Nutrient limitation of primary productivity in the Southeast Pacific (BIOSOPE cruise). Biogeosciences 5:215-225.
146. Goebel, N. L., Edwards, C. A., Church, M. J. & Zehr, J. P. 2007. Modeled contributions of three types of diazotrophs to nitrogen fixation at Station ALOHA. ISME J. 1:606-619.
147. Zehr, J. P., Bench, S. R., Mondragon, E. A., McCarren, J. & DeLong, E. F. 2007. Low genomic diversity in tropical oceanic N_2-fixing cyanobacteria. PNAS 104(45):17807-17812.
148. Hewson, I., Moisander, P. H., Morrison, A. E. & Zehr, J. P. 2007. Diazotrophic bacterioplankton in a coral reef lagoon: phylogeny, diel nitrogenase expression, and response to phosphate enrichment. ISME J. 1: 78-91.
149. Moisander, P. H., Morrison, A. E., Ward, B. B., Jenkins, B. D. & Zehr, J. P. 2007. Spatial-temporal variability in diazotroph assemblages in Chesapeake Bay using an oligonucleotide *nifH* microarray. Environ. Microbiol. 9(7):1823-1835.
150. Needoba, J. A., Foster, R. A., Sakamoto, C., Zehr, J. P. & Johnson, K. S. 2007. Nitrogen fixation by unicellular diazotrophic cyanobacteria in the temperate oligotrophic North Pacific Ocean. Limnol. Oceanogr. 52(4): 1317-1327.
151. Rabouille, S., Edwards, C. A. & Zehr, J. P. 2007. Modelling the vertical distribution of *Prochlorococcus* and *Synechococcus* in the North Pacific Subtropical Ocean. Environ. Microbiol. 9(10): 2588-2602.
152. Foster, R. A., Subramaniam, A., Mahaffey, C., Carpenter, E. J., Capone, D. G. & Zehr, J. P. 2007. Influence of the Amazon River Plume on distributions of free-living and symbiotic cyanobacteria in the western tropical north Atlantic Ocean. Limnol. Oceanogr. 52(2): 517-532.
153. Short, S. M. & Zehr, J. P. 2007. Nitrogenase gene expression in the Chesapeake Bay Estuary. Environ. Microbiol. 9(6):1591-1596.
154. Hewson, I., Moisander, P. H., Achilles, K. M., Carlson, C. A., Jenkins, B. D., Mondragon, E. A., Morrison, A. E. & Zehr, J. P. 2007. Characteristics of diazotrophs in surface to abyssopelagic waters of the Sargasso Sea. Aquat. Microb. Ecol. 46:15-30.
155. Ward, B. B., Capone, D. G. & Zehr, J.P. 2007. What's new in the nitrogen cycle? Oceanography. **20**(2):101-109.
156. Zehr, J. P., Montoya, J. P., Jenkins, B. D., Hewson, I., Mondragon, E., Short, C. M., Church, M. J., Hansen, A. & Karl, D. M. 2007. Experiments linking nitrogenase gene expression to nitrogen fixation in the North Pacific subtropical gyre. Limnol. Oceanogr. 52(1):169-183.
157. Jenkins, B. D., Zehr, J. P., Gibson, A. & Campbell, L. 2006. Cyanobacterial assimilatory nitrate reductase gene diversity in coastal and oligotrophic marine environments. Environ. Microbiol. 8(12):2083-2095.
158. Foster, R. A. & Zehr, J. P. 2006. Characterization of diatom-cyanobacteria symbioses on the basis of *nifH*, *hetR*, and 16S rRNA sequences. Environ. Microbiol. 8(11):1913-

1925.
159. Moisander, P. H., Shiue, L., Steward, G. F., Jenkins, B. D., Bebout, B. M. & Zehr, J. P. 2006. Application of a *nifH* oligonucleotide microarray for profiling diversity of N_2-fixing microorganisms in marine microbial mats. Environ. Microbiol. 8(10):1721-1735.
160. Burns, J. A., Zehr, J. P., Montoya, J. P, Kustka, A. B., & Capone, D. G. 2006. Effect of EDTA additions on natural *Trichodesmium* spp. (Cyanophyta) populations. J. Phycol. 42:900-904.
161. Gibson, A. H., Jenkins, B. D., Wilkerson, F. P., Short, S. M. & Zehr, J. P. 2006. Characterization of cyanobacterial *glnA* gene diversity and gene expression in marine environments. FEMS Microbiol. Ecol. 55:391-402.
162. Church, M. J., Short, C. M, Jenkins, B. D., Karl, D. M, * Zehr, J. P. 2005. Temporal patterns of nitrogenase gene (*nifH*) expression in the oligotrophic North Pacific Ocean. Appl. Environ. Microbiol. 71(9):5362-5370.
163. Church, M. J., Jenkins, B. D., Karl, D. M. & Zehr, J. P. 2005. Vertical distributions of nitrogen-fixing phylotypes at Stn ALOHA in the oligotrophic North Pacific Ocean. Aquat Microb. Ecol. 38:3-14.
164. Montoya, J. P., Holl, C. M. Zehr, J. P., Hansen, A., Villareal, T. A. & Capone, D. G. 2004. High rates of N_2 fixation by unicellular diazotrophs in the oligotrophic Pacific Ocean. Nature. 430:1027-1031.
165. Short, S. M., Jenkins, B. D. & Zehr, J. P. 2004. Spatial and temporal distribution of two diazotrophic bacteria in the Chesapeake Bay. Appl. Environ. Microbiol. 70:2186-2192.
166. Jenkins, B. D., Steward, G. F., Short, S. M., Ward, B. B. & Zehr, J. P. 2004. Fingerprinting diazotroph communities in the Chesapeake Bay by using a DNA macroarray. Appl. Environ. Microbiol. 70(3):1767-1776.
167. Steward, G. F., Jenkins, B. D., Ward, B. B. & Zehr, J. P. 2004. Development and testing of a DNA macroarray to assess nitrogenase (*nifH*) gene diversity. Appl. Environ. Microbiol. 70(3):1455-1465.
168. Omoregie, E. O., Crumbliss, L. L., Bebout, B. M. & Zehr, J. P. 2004. Determination of nitrogen-fixing phylotypes in *Lyngbya* sp. and *Microcoleus chthonoplastes* cyanobacterial mats from Guerrero Negro, Baja California Mexico. Appl. Environ. Microbiol. 70(4): 2119-2128.
169. Omoregie, E. O., Crumbliss, L. L., Bebout, B. M. & Zehr, J. P. 2004. Comparison of diazotroph community structure in *Lyngbya sp*. and *Microcoleus* chthonoplastes dominated microbial mats from Guerrero Negro, Baja, Mexico. FEMS Microbiol. Ecol. 47:305-318.
170. Steward, G. F., Zehr, J. P., Jellison, R., Montoya, J. P. & Hollibaugh, J. T. 2004. Vertical distribution of nitrogen-fixing phylotypes in a meromictic, hypersaline lake. Microbial. Ecol. 47:30-40.
171. Zehr, J. P., Crumbliss, L. L., Church, M. J., Omoregie, E. O. & Jenkins, B. D. 2003. Nitrogenase genes in PCR and RT-PCR reagents and implications for studies of diverse functional genes. Bio.Techniques 35(5):996-1005.
172. Karouna-Renier, N. K. & Zehr, J. P. 2003. Short-term exposures to chronically toxic copper concentrations induce HSP70 proteins in midge larvae (*Chironomus tentans*). The Science of the Total Environment. 312:267-272.
173. Zehr, J. P., Jenkins, B. D., Short, S. M. & Steward, G. F. 2003. Nitrogenase gene diversity and microbial community structure: a cross-system comparison. Environ. Microbiol. 5:539-554.

174. Burns, J. A., Zehr, J. P. & Capone, D. G. 2002. Nitrogen-fixing phylotypes of Chesapeake Bay and Neuse River estuary sediments. Microbial. Ecol. 44:336-343.
175. Zehr, J. P. & Ward, B. B. 2002. Nitrogen cycling in the ocean: New perspectives on processes and paradigms. Appl. Environ. Microbiol. 68:1015-1024.
176. Allen, A. E., Booth, M. G., Frischer, M. E., Verity, P. G., Zehr, J. P. & Zani, S. 2001. Diversity and detection of nitrate assimilation genes in marine bacteria. Appl. Environ. Microbiol. 67(11):5343-5348.
177. Zehr, J. P., Waterbury, J. B., Turner, P. J., Montoya, J. P., Omoregie, E., Steward, G. F., Hansen, A & Karl, D. M. 2001. Unicellular cyanobacteria fix N_2 in the subtropical North Pacific Ocean. Nature 412:635-638.
178. MacGregor, B. J., Van Mooy, B., Baker, B. J., Mellon, M., Moisander, P. H., Paerl, H. W., Zehr, J. P. Hollander, D. & Stahl, D. A. 2001. Microbiological, molecular biological, and stable isotopic evidence for nitrogen fixation in the open waters of Lake Michigan. Environ. Microbiol. 3(3): 205-219.
179. Affourtit, J., Zehr, J. P. & Paerl, H. W. 2001. Distribution of nitrogen-fixing microorganisms along the Neuse River Estuary, North Carolina. Microbial. Ecol. 41:114-123.
180. Zani, S., Mellon, M. T., Collier, J. & Zehr, J. P. 2000. Expression of *nifH* genes in natural microbial assemblages in Lake George, New York, detected by reverse transcriptase PCR. Appl. and Environ. Microbiol. 66:3119-3124.
181. Dominic, B., Zani, S., Chen, Y. B., Mellon, M. T. & Zehr, J. P. 2000. Organization of the *nif* genes of the nonheterocystous cyanobacterium *Trichodesmium* sp. IMS101. J. Phycol. 36: 693-701.
182. Zehr, J. P., Carpenter, E. J. & Villareal, T. A. 2000. New perspectives on nitrogen-fixing microorganisms in tropical and subtropical oceans. Trends in Microbiol. 8:68-73.
183. Zehr, J. P. & Voytek, M. A. 1999. Molecular ecology of aquatic communities: reflections and future directions. Hydrobiologia 401:1-8.
184. Chen, Y. B., Dominic, B., Zani, S., Mellon, M. T. & Zehr, J. P. 1999. Expression of photosynthesis genes in relation to nitrogen fixation in the diazotrophic filamentous nonheterocystous cyanobacterium *Trichodesmium* sp. IMS 101. Plant Mol. Biol. 41:89-104.
185. Karouna-Renier, N. K. & Zehr, J. P. 1999. Ecological implications of molecular biomarkers: assaying sub-lethal stress in the midge *Chironomus tentans* using heat shock protein 70 (HSP-70) expression. Hydrobiologia 401:255-264.
186. Methé, B. A. & Zehr, J. P. 1999. Diversity of bacterial communities in diverse Adirondack lakes: do species assemblages reflect lake water chemistry? Hydrobiologia 401:77-96.
187. Momen, B., Zehr, J. P., Boylen, C. W. & Sutherland, J. W. 1999. Determinants of summer nitrate concentration in a set of Adirondack lakes, New York. Water Air Soil Poll. 111:19-28.
188. Sullivan, T. J., Charles, D. F., Bernert, J. A., McMartin, B., Vaché, K. B. & Zehr, J. P. 1999. Relationship between landscape characteristics, history, and lakewater acidification in the Adirondack Mountains, New York. Water Air Soil Poll.112:407-427.
189. Braun, S. T., Proctor, L. M., Zani, S., Mellon, M. T. & Zehr, J. P. 1999. Molecular evidence for zooplankton-associated nitrogen-fixing anaerobes based on amplification of the *nifH* gene. FEMS Microbiol. Ecol. 28:273-279.
190. Manson, J. R., DiStefano, T. D. & Zehr, J. P. 1999. Environmental engineers and

environmental science: Comparative approaches in practice, research and education. J. Environ. Eng.-ASCE 125:5-6.
191. Dominic, B., Chen, Y. B. & Zehr, J. P. 1998. Cloning and transcriptional analysis of the *nifUHDK* operon reveals stable *nifD*, *nifDK* and *nifK* transcripts in *Trichodesmium* sp. IMS 101. Microbiology 144:3359-3368.
192. Zwart, G., Hiorns, W. D., Methé, B. A., van Agterveld, M. P., Huismans, R., Nold, S. C., Zehr, J. P. & Laanbroek, H. J. 1998. Near-identical 16S rRNA sequences recovered from lakes in North America and Europe indicate the existence of clades of globally distributed freshwater bacteria. Syst. Appl. Microbiol. 21:546-556.
193. Zehr, J. P., Mellon, M. T. & Zani, S. 1998. New nitrogen-fixing microorganisms detected in oligotrophic oceans by amplification of nitrogenase (*nifH*) genes. Appl. Environ. Microbiol. 64:3444-3450.
194. Chen, Y. B., Dominic, B., Mellon, M. T. & Zehr, J. P. 1998. Circadian rhythm of nitrogenase gene expression in the diazotrophic filamentous nonheterocystous cyanobacterium *Trichodesmium* sp. Strain IMS 101. J. Bacteriol. 180:3598-3605.
195. Methé, B. A., Hiorns, W. D. & Zehr, J. P. 1998. Contrasts between marine and freshwater bacterial community composition: analyses of communities in Lake George and six other Adirondack lakes. Limnol. Oceanogr. 43:368-374.
196. Momen, B. & Zehr, J. P. 1998. Watershed classification by discriminant analyses of lakewater-chemistry and terrestrial characteristics. Ecol. Appl. 8:497-507.
197. Hare, J. A., Cowen, R. K., Zehr, J. P., Juanes, F. & Day, K. H. 1998. A correction to: Biological and oceanographic insights from larval labrid (Pisces: Labridae) identification using mtDNA sequences. Mar. Biol. 130:589-592.
198. Zehr, J. P., Harris, D., Dominic, B. & Salerno, J. 1997. Structural analysis of the *Trichodesmium* nitrogenase iron protein: implications for aerobic nitrogen fixation activity. FEMS Microbiol. Lett. 153:303-309.
199. Hiorns, W. D., Methé, B. A., Nierzwicki-Bauer, S. A. & Zehr, J. P. 1997. Bacterial diversity in Adirondack Mountain lakes as revealed by 16S rRNA gene sequences. Appl. Environ. Microbiol. **63**:2957-2960.
200. Capone, D. G., Zehr, J. P., Paerl, H. W., Bergman, B. & Carpenter, E. J. 1997. *Trichodesmium*, a globally significant marine cyanobacterium. Science 276:1221-1229.
201. Zehr, J. P., Mellon, M. T. & Hiorns, W. D. 1997. Phylogeny of cyanobacterial *nifH* genes: Evolutionary implications and potential applications to natural assemblages. Microbiol.-UK 143:1443-1450.
202. Momen, B., Eichler, L. W., Boylen, C. W. & Zehr, J. P. 1997. Are recent watershed disturbances associated with temporal and spatial changes in water quality of Lake George, New York, USA? Environ. Manage. 21:725-732.
203. Momen, B., Eichler, L. W., Boylen, C. W. & Zehr, J. P. 1996. Application of multivariate statistics in detecting temporal and spatial patterns of water chemistry in Lake George, New York. Ecol. Model. 91:183-192.
204. Kramer, J. G., Wyman, M., Zehr, J. P. & Capone, D. G.. 1996. Diel variability in transcription of the structural gene for glutamine synthetase (*glnA*) in natural populations of the marine diazotrophic cyanobacterium *Trichodesmium thiebautii*. FEMS Microbiol.Ecol. 21:187-196.
205. Chen, Y. B., J. P. Zehr, and M. Mellon. 1996. Growth and nitrogen fixation of the diazotrophic filamentous nonheterocystous cyanobacterium *Trichodesmium* sp. IMS 101 in defined media: Evidence for a circadian rhythm. J. Phycol. 32:916-923.

206. Zehr, J. P., Braun, S., Chen, Y. & Mellon, M..1996. Nitrogen fixation in the marine environment: relating genetic potential to nitrogenase activity. J. Exp. Mar. Biol. Ecol. 203:61-73.
207. Wyman, M., Zehr, J. P. & Capone, D. G. 1996. Temporal variability in nitrogenase gene expression in natural populations of the marine cyanobacterium *Trichodesmium thiebautii*. Appl. Environ. Microbiol. 62:1073-1075.
208. Capone, D. G. & Zehr, J. P. 1996. Special section: Probing biogeochemical processes with molecular tools-Proceedings of a Microbial Ecology Division (N) Seminar at the 94th Annual Meeting of the American Society for Microbiology, May 1994-Preface. Microb. Ecol. 32(3):229-230.
209. Zehr, J. P & Capone, D. G.. 1996. Problems and promises of assaying the genetic potential for nitrogen fixation in the marine environment. Microb. Ecol. 32:263-281.
210. Zehr, J. P., Mellon, M., Braun, S., Litaker, W., Steppe, T. & Paerl, H. W. 1995. Diversity of heterotrophic nitrogen-fixation genes in a marine cyanobacterial mat. Appl. Environ. Microbiol. 61:2527-2532.
211. Ben-Porath, J. & Zehr J. P. 1994. Detection and characterization of cyanobacterial *nifH* genes. Appl. Environ. Microbiol. 60:880-887.
212. Hare, J., Cowen, R. Zehr, J. P., Juanes, F. & Day, K. A. 1994. Biological and oceanographic insights from larval labrid (Pisces:Labridae) identification using mtDNA sequences. Mar. Biol. 118:17-24.
213. Kirshtein, J. D., Zehr J. P. & Paerl, H. W. 1993. Determination of N_2 fixation potential in the marine environment-application of the polymerase chain reaction. Mar. Ecol.-Prog. Ser. 95:305-309.
214. Zehr, J. P., Wyman, M., Miller, V., Duguay, L. & Capone, D. G. 1993. Modification of the Fe protein of nitrogenase in natural populations of *Trichodesmium thiebautii*. Appl. Environ. Microbiol. 59:669-676.
215. Ben-Porath, J., Carpenter, E. J. & Zehr, J. P. 1993. Genotypic relationships in *Trichodesmium* (Cyanophyceae), based on *nifH* sequence comparisons. J. Phycol. 29:806-809.
216. Ohki, K., Zehr, J. P. & Fujita, Y. 1992. Regulation of nitrogenase activity in relation to the light dark regime in the filamentous non-heterocystous cyanobacterium *Trichodesmium* sp. NIBB-1067. J. Gen. Microbiol. 138:2679-2685.
217. Zehr, J. P., Ohki, K. & Fujita, Y. 1991. Arrangement of nitrogenase structural genes in an aerobic filamentous nonheterocystous cyanobacterium. J. Bacteriol. 173:7055-7058.
218. Zehr, J. P., Ohki, K., Fujita, Y. & Landry, D. 1991. Unique modification of adenine in genomic DNA of the marine cyanobacterium *Trichodesmium* sp. Strain NIBB-1067. J. Bacteriol. 173:7059-7062.
219. Kirshtein, J. D., Paerl, H. W. & Zehr, J. P. 1991. Amplification, cloning and sequencing of a *nifH* segment from aquatic microorganisms and natural communities. Appl. Environ. Microbiol. 57:2645-2650.
220. Ohki, K., Zehr, J. P., Falkowski, P. G. & Fujita, Y.. 1991. Regulation of the biosynthesis and activity of nitrogenase in the marine nonheterocystous cyanobacterium *Trichodesmium* sp. Arch. Microbiol. 156:335-337.
221. Zehr, J. P., Limberger, R. J., Ohki, K. & Fujita, Y. 1990. Antiserum to nitrogenase generated from an amplified fragment of *nifH* from natural populations of *Trichodesmium* spp. Appl. Environ. Microbiol. 56:3527-3531.
222. Capone, D. G., O'Neil, J. M., Zehr, J. P. & Carpenter, E. J. 1990. Basis for diel variation

in nitrogenase activity in the marine planktonic cyanobacterium, *Trichodesmium thiebautii*. Appl. Environ. Microbiol. 56:3532-3536.

223. Zehr, J. P. & McReynolds, L. A.. 1989. The use of degenerate oligonucleotides for amplification of the *nifH* gene from the marine cyanobacterium *Trichodesmium thiebautii*. Appl. Environ. Microbiol. 55:2522-2526.
224. Zehr, J. P., Capone, D. G. & Falkowski, P. G. 1989. Rapid incorporation of $^{13}NO_3^-$ by NH_4^+-limited phytoplankton. Mar. Ecol.-Progr. Ser. 51:237-241.
225. Zehr, J. P. & P. G. Falkowski. 1988. Pathway of ammonium assimilation in a marine diatom determined with the radiotracer ^{13}N. J. Phycol. 24:588-591.
226. Kolber, Z., Zehr, J. P. & Falkowski, P. G.. 1988. Effects of growth irradiance and nitrogen limitation on photosynthetic energy conversion in photosystem II. Plant Physiol. 88:923-929.
227. Zehr, J.P., Falkowski, P.G. Fowler, J. & Capone, D. G.. 1988. Coupling between ammonium uptake and incorporation in a marine diatom: experiments with the short-lived radiotracer N-13. Limnol. Oceanogr. 33:518-527.
228. Zehr, J. P., Paulsen, S. G. Axler, R. P. & Goldman, C. R. 1988. Dynamics of dissolved organic nitrogen in subalpine Castle Lake. Hydrobiologia 157:33-45.
229. Zehr, J. P., Harvey, R. W. Oremland, R. S., Cloern, J. George, L. H. & Lane, J. L.. 1987. Big Soda Lake (Nevada). 1. Pelagic bacterial heterotrophy and biomass. Limnol. Oceanogr. 32:781-793.
230. Zehr, J. P. & R. S. Oremland. 1987. Reduction of selenate to selenide by sulfate-respiring bacteria: experiments with cell-suspensions and estuarine sediments. Appl. Environ. Microbiol. 53:1365-1369.
231. Oremland, R. S. & J. P. Zehr. 1986. Formation of methane and carbon dioxide from dimethylselenide in anoxic sediments and by a methanogenic bacterium. Appl. Environ. Microbiol. 52:1031-1036.
232. Zehr, J. P., Axler, R. P. & Goldman, C. R. 1985. Heterotrophic mineralization of amino acid nitrogen in subalpine Castle Lake, California. Mar. Chem. 16:343-350.

Reports

Joint, I., Karl, D. M., Doney, S. C., Armbrust, E. V., Balch, W., Berman, M., Bowler, C., Church, M., Dickson, A., Heidelberg, J., Iglesias-Rodriguez, D., Kirchman, D., Kolber, Z., Letelier, R., Lupp, C., Maberly, S., Park, S., Raven, J., Repeta, D. J., Riebesell, U., Steward, G., Tortell, P., Zeebe, R. E. & Zehr, J. P. 2009. Consequences of high CO_2 and ocean acidification for microbes in the global ocean, Report of expert meeting at U. Hawaii, 24-26 February 2009 organized by Plymouth Marine Laboratory and Center for Microbial Oceanography Research and Education, 23pp.

LECTURES

2023 Zehr, J. P. & Turk-Kubo, K. A. Role of particles in marine nitrogen fixation. Biofilm-biofouling-bioaggregates Special Seminar Series (Virtual), Zukerberg

Institute for Water Research, Ben-Gurion University of the Negev, 8499000, Israel.

2022 Zehr, J. P. Cyanobacteria in symbiosis: learning from new models. ProSynFest (Closing Keynote). March. Cordoba, Spain.

2022 Zehr, J. P. The Marine Unicellular UCYN-A Symbiosis: Cellular Interactions to Global Ecology. Gordon Research Conference on Marine Microbes. May. Les Diablerets, Switzerland. (Invited)

2018 Zehr, J. P. (Cancelled participation due to lack of funds) Unicellular cyanobacterial nitrogen fixation in the sea. XVI Symposium on biological nitrogen fixation with non-legumes. August 26-28, Foz du Iguaçu, Brazil. (Invited)

2018 Zehr, J.P., Landa, M., Cornejo Castillo, F. , Pérez Cabello, A. , Gradoville M.R. and Turk-Kubo, K.Single celled N2 fixation in marine haptophytes: ecology and evolution. 13th European Nitrogen Fixation Congress. August 18-21. Stockholm, Sweden. (Plenary)

2018 Zehr, J. P. International Conference on Microbial Photosynthesis. Vancouver, BC. August 9-12. (Plenary)

2018 Zehr, J. P. Ocean Carbon and Biogeochemistry Workshop. Woods Hole, MA, June 25-28, 2018. (Plenary)

2017 Zehr, J. P. (Invited, declined due to travel conflict). 43rd Midwest/Southeast Photosynthesis Conference. Turkey Run State Park, Marshall, IN, October 27-29, 2017

2017 Zehr, J. P. Single-celled symbiosis in diatoms and haptophytes: implications for biology, evolution and ecology. Plenary. 4th International Conference Molecular Life of Diatoms Workshop (MLD4), Kobe, Japan.July 9-13, 2017. (Invited)

2017 Zehr, J. P. Marine photosynthesis and nitrogen fixation. Gordon Research Conference, Maine, July 2017 (Invited, Cancelled due to scheduling conflict)

2017 Zehr J. P. Marine nitrogen fixing symbiosis (Invited, Cancelled due to scheduling conflict,replaced by previous postdoc A. Thompson). Phycological Society Annual Meeting, Monterey, CA. June 2017.

2017 Zehr, J. P. Marine microbes, ocean biogeochemistry and environmental change: from genes to ecosystems. Third Xiamen Symposium on Marine Environmental Sciences. Xiamen University. January 2017. (Plenary, Invited)

2016 Zehr, J. P. Marine unicellular symbiotic cyanobacteria: significance in global ecology, physiology and evolution. BNF-Non Legume Satellite Symposium. 12th European Nitrogen Fixation Conference, August 23-24, 2016. (Invited)

2016 Zehr, J.P. Unusual marine nitrogen-fixing symbiosis: implications for evolution and global nitrogen fixation. Joint Academic Microbiology Seminars. Sydney, Australia. March 2016. (Invited)

2015 Zehr, J. P. Mono et mono; nitrogen-fixing symbiosis between single cells, lessons from the marine environment. 19th International Congress on Nitrogen Fixation, Asilomar, California, October 2015. (Invited)

2015 Zehr, J. P. New horizons in microbial ecology: exciting changes and challenges from the 'omics era. Society for Aquatic Microbial Ecology, Uppsala, Sweden, August 2015. (Invited)

2015 Zehr, J.P. Nitrogen-fixing symbioses between unicellular organisms are critical for open ocean ecosystems. BAGECO, Milan, Italy, June 2015.

2015 Zehr, J. P. Light and nitrogen fixation: phototrophic nitrogen fixation through symbiosisAmerican Society for Microbiology. Symposium on “Enlightened Microorganisms”. (Invited session and speaker).

2015 Zehr, J. P. Omics and Ecosystems-*Transcriptomics: Troubles and Triumphs* BLUEPRINT EU Workshop, Stockholm, Sweden. (Invited)

2015 Zehr, J. P. What do we know about the global distribution of diazotrophs and the main groups/physiologies ? 2015 Workshop on “Environmental controls on marine nitrogen fixation”, Granada Spain, Feb 22, 2015. (Invited)

2014 Zehr, J. P. Microbes and biogeochemical cycles. Simons Foundation SCOPE meeting. Simons Foundation, NYC. Dec 4, 2014. (Invited)

2014 Zehr, J. P. C-MORE Ocean Discoveries and the Future. NSF Science and Technology Centers Director's Meeting. Fort Collins, CO. August 2014.

2014 Zehr, J. P. Oceanic nitrogen fixing microorganisms: discoveries and unknowns. European Nitrogen Fixation Conference, Tenerife. September 7-10. (Invited)

2014 Zehr, J. P. Photosynthesis and nitrogen fixation in an unusual marine uncultivated symbiotic cyanobacterium. International Society for Microbial Ecology. Seoul, Korea. August 24-29.(Invited)

2014 Zehr, J. P. New insights into nitrogen fixation in oceanic microbial communities from genomics, transcriptomics and remote instrumentation. EU FACILIS-2014. Milano, Italy. July 22-26, 2014. (Invited)

2014 Zehr, J. P., Carter, Foster, Thompson, Tripp, H.J.Same stage but different actors: 20 years of change in nitrogen fixation at Station ALOHA . Ocean Sciences Meeting, Honolulu, HI.

2014 Zehr, J. P. Microorganisms, biogeochemistry, environmental change and meta’omics. BLUEPRINT Workshop, Warnemunde, Germany. January 28, 2014. (Invited)

2013 **Keynote**. Zehr, J. P. Nitrogen fixation in the sea: Evolution, diversity and global biogeochemistry. 18th Annual International Congress on Nitrogen Fixation. Miyazaki, Japan. October 14-18, 2013. http://icnf18.brc.miyazaki-u.ac.jp/index.html (Invited)

2013 Zehr, J. P. New insights into nitrogen fixation in oceanic microbial communities from genomics, transcriptomics and remote instrumentation. Congresso Brasileiro de Microbiologie, Natal, Rio Grande do Norte, Brazil. September 29-October 3, 2013. (Invited)
http://www.sigeventos.com.br/sbmicrobiologia/admin/pro_lista_programa.asp?eveId=5

2013 Zehr, J. P. Metagenomic and metatranscriptomic insights into the marine nitrogen cycle. Gordon Research Conference, Hong Kong, China, August 11-16, 2013 (Invited).

2013 **Plenary.** Zehr, J. P. Nitrogen-fixing cyanobacterial associations in the sea. 11th Workshop on Cyanobacteria preceeding the 16th International Congress on Photosynthesis Research, Washington Univ., St. Louis, MO, August 7-11, 2013.(Invited)

2013 Zehr, J. P. Microbial interactions with nitrogen-fixing oceanic cyanobacteria. European Science Foundation Conference on Molecular Bioenergetics of Cyanobacteria. Pultusk, Poland, April 15- 20, 2013 (Invited).

2012 Zehr, J. Marine microbial diversity, biogeochemistry and the future of microbial oceanography. Autonomous, in situ microbial diagnostics and monitoring for microbial oceanography CSIRO Marine and Atmospheric Research in Hobart,Tasmania (Australia), 5-6 November 2012. (Invited)

2012 **Plenary**. Zehr, J. P. Environment and Ecology. 14th International Symposium on Phototrophic Prokaryotes, Porto, Portugal, August 5-10, 2012. (Invited)

2012 **Keynote**. Zehr, J. P. Insights into oceanic nitrogen fixing microbial communities through 'omics approaches, VIII Congress of the Argentinean Society for General Microbiology, Mar del Plata, Argentina, July 4-6, 2012. (Invited)

2012 **Keynote**. Zehr, J. P. Novel oceanic nitrogen fixing symbioses illuminated with metagenomics, VIII Congress of the Argentinean Society for General Microbiology, Mar del Plata, Argentina, July 4-6, 2012. (Invited)

2012 **Plenary**. Zehr, J. P. Molecular and genomic insights into species interactions and functions of oceanic microbial communities ASM General Meeting, San Francisco, CA, June 16-19, 2012 (Division Lecture). (Invited)

2012 The Agouron Institute- University of Hawai'i Summer Course in Microbial Oceanography Instructor, 4-6 June 2012. Honolulu, Hawai'i. (Invited)

2012 **Plenary**. Zehr, J. P. Nitrogen cycling in the oceans: from genomes to biomes. University of Sao Paulo. Sao Paulo, Brazil, May 16-18, 2012. (Invited)

2012 Zehr, J. P. Climate-Biogeochemistry interactions in the tropical oceans (SFB-754) Colloquium, Kiel, Germany, February 9, 2012 (Invited)

2011 Zehr, J. P. Ecological genomics: from species and species interaction to microbial communities. Integrative Ecological Genomics, Conferences Jacques Monod, Roscoff, France, October 15-19, 2011.(Invited)

2011 Zehr, J. P. Genomics of novel nitrogen-fixing cyanobacteria. 8th European Workshop on Molecular Biology of Cyanobacteria. Naantali, Finland, August 28-September 1, 2011.(Invited)

2011 **Plenary**. Zehr, J. P. Ecological aspects of nitrogen-fixing cyanobacteria illuminated by genomics and metagenomics. Plenary Session- Genomic insight into the ecology and evolution of algae and protists. Phycological Society of America, Seattle, WA, July 13-17, 2011. (Invited)

2011 **Keynote**. Zehr, J. P. Nitrogen cycle in the ocean. 11th Conference on Bacterial Genetics and Ecology, Corfu, Greece, May 29-June 2, 2011. (Invited)

2010 Zehr, J. P.. Microbes, genomics and proteomics in ocean and climate. American Society for Mass Spectrometry, Asilomar Conference Center. Pacific Grove, CA, October 11, 2010 (Invited, Dinner Speaker)

2010 Zehr, J. P. The evolving story of microbial nitrogen cycling processes in low oxygen zones. Ocean carbon and Biogeochemistry Summer Workshop, Scripps Seaside Forum, La Jolla, CA July, 19-22, 2010 (Invited)

2010 Zehr, J. P. Microbial Diversity Course lecture, Marine Biological Laboratory, Woods Hole, MA, June 2010. (Invited)

2010 Zehr, J. P. Oceanic nitrogen fixation. Microbiology of the Oceans Symposium. Edinburgh, U.K., 29-30 March, 2010. (Invited)

2010 The Agouron Institute- University of Hawai'i Summer Course in Microbial Oceanography Instructor, 7-10 June 2010. Honolulu, Hawai'i. (Invited)

2010 Zehr, J. P. Genomics and metagenomics insights into oceanic nitrogen fixation. International Society for Microbial Ecology. Seattle, Wa, 22-27 August, 2010. (Invited)

2009 Zehr, J. P. "Diversity of nitrogen cycling microorganism in the ocean: controls on distribution and activity" and "Molecular approaches for studying microbes and microbial processes in coastal organisms". Workshop on biogeochemical impacts of climate and land-use change on marine ecosystems. International Center for Theoretical Physics - UNESCO, Trieste, (Italy) 2-10 November, 2009. (Invited)

2009 Zehr, J. P. New perspectives in biology from the oceans: new organisms and new modes of metabolism of uncultivated cyanobacteria. 26th Annual Eastern Regional Photosynthesis Conference, Marine Biological Laboratory, Woods Hole, MA, April 17-19, 2009. (Invited)

2009 Zehr, J. P., B. J Carter , I. Hewson, *et al.* Identifying and charcterizing nitrogen-fixing microbial communities. ASLO Ocean Sciences Meeting, Nice, France, January, 25-30, 2009. (Invited).

2008 Zehr, J. P. Biodiversity patterns of nitrogen-fixing microorganisms in the open ocean:insights from genetics and genomics. 2nd Bi-Annual Symposium "The Future Ocean", Kiel, Germany, Oct. 6-10. (Invited)

2008 Zehr, J. P., B. J.Carter, I Biegala, E. Mondragon, and J. P. Montoya, Characterization of globally distributed Group A cyanobacteria. 12th International Symposium on Microbial Ecology-ISME 12, Cairns, Australia, August 17-22, 2008.

2008 The Agouron Institute-University of Hawai'i Summer Course in Microbial Oceanography Instructor, June 29-July 3. Honolulu, Hawai'i. (Invited)

2007 Zehr, J. P. Ocean genomics, biogeochemistry and instrumentation applications. Workshop on the Implications and Opportunities of the Marine Genomics Revolution. Bermuda Institute of Ocean Sciences (BIOS), St. George's, Bermuda, Oct. 28-30. (Invited)

2007 **Keynote.** Zehr, J. P. Ecology and population dynamics of nitrogen fixing cyanobacteria in the global ocean. 9th Cyanobacterial Molecular Biology Workshop, Lake Delevan, WI, USA, Jun. 6-10.(Invited, Dinner Speaker)

2007 Zehr, J. P. Open ocean nitrogen fixation: Genes to biomes. Sequencing the seas: of accessing unknown microbial function. Royal Society, London. Apr. 30-May 1. (Invited)

2006 Marine microbes and habitability of the planet Earth: from genomes to biogeochemistry of the biosphere. Mysteries of the microbial world. Part of panel on Microbes, Minerals and the Environment. Philip Hauge Abelson Advancing Science Seminars Series, Washington, DC. Oct. 26. (Invited)

2006 California Metagenomics Workshop, UC Berkeley invited panelist. Sept. 18.

2006 **Plenary**. Ecology and population dynamics of nitrogen fixing cyanobacteria in the global ocean. International Society for Photosynthetic Prokaryotes (ISPP). Pau, France. August 27- Sept. 1 (Invited).

2006 Key species in biogeochemical cycles: Nitrogen fixers of the oceans. 11th International Symposium on Microbial Ecology (ISME): The Hidden Powers-Microbial Communities in Action. Vienna, Austria. Aug. 20–26. (Invited).

2006 **Keynote**. Global distribution and activities of microorganisms: future directions and lessons from functional genes. Gordon Research Conference on Marine Microbes: Activities and Interactions. University of New England, Biddeford, Maine. July 23-28. (Invited)

2006 **Symposium Speaker.** Molecular ecology of marine N_2-fixing microorganisms: from genes to functionThe Agouron Institute-University of Hawai'i Summer Course in Microbial Oceanography Symposium, July 15. Honolulu, Hawai'i.

2005 Functional diversity of microorganisms: What do we know and is it important? Microbial marine communities diversity: From the culture to function' (MIRACLES) Symposium. Renesse, The Netherlands. Sept. (Invited).

2005 Real time PCR applications for quantifying nitrogenase genes and gene expression. American Society of Limnology and Oceanography/Aquatic Sciences 2005 Meeting. Salt Lake City, UT. (Invited).

2004 **Plenary**. New nitrogen fixing microorganisms in the open and ocean and implications for ecology of the global ocean. XIV International Congress on Nitrogen Fixation. Beijing, China. Oct. 2004. (Invited)

2004 The nitrogen cycle and remote sensing. 10th International Symposium on Microbial Ecology-"Microbial Planet: Sub-surface to Space." International Society for Microbial Ecology. Cancun, Mexico. Aug., 2004 (Invited).

2004 Perspectives on oceanic cyanobacteria gleaned from molecular biology. Gordon Research Conference "Marine cyanobacteria diversity and phylogeny." Roscoff, France. (Invited).

2004 **Plenary**. Molecular underpinnings of the global nitrogen cycle-new perspectives on old problems. American Society for Limnology and Oceanography/The Oceanographic Society 2004 Conference. Honolulu, HI. (Invited)

2003 Biocomplexity, bioinformatics and micromanagement of microarrays of nitrogenase genes. American Society for Limnology and Oceanography Aquatic Sciences Meeting. Salt Lake City, Utah.

2002 Nitrogenase gene expression in aquatic nitrogen fixing cyanobacteria. American Society for Limnology and Oceanography Annual Meeting. June, 2002. Victoria, British Columbia (Invited).

2002 Nitrogen assimilation: from genomes to gene expression in the oceans. Special Session: Microbial Genomes. American Society for Limnology and Oceanography Ocean Sciences Meeting. Feb. 11-15. Honolulu, HI (Invited)

2002 Diazotroph diversity and novel nitrogenases of marine microbes. Special session: Analyzing functional genes from natural environments. American Society for Microbiology. Salt Lake City, UT (Invited)

2002 Nitrogenase gene expression in the open ocean: Implications for global carbon and nitrogen cycling. Divisional Symposium: Microbial activities on a global scale. American Society for Microbiology. Salt Lake City, UT. (Invited)

2001 Workshop on Natural Communities of Nitrogen Fixing Cyanobacteria: New Techniques for Field Studies. Bertinoro, Forli, Italy. New approaches for detecting nitrogenase gene expression and characterizing nif gene diversity in cyanobacterial populations. (Invited)

2001 Genetic and isotopic evidence for new nitrogen fixers at Station ALOHA: Implications for time-series programs (Bermuda Biological Station for Research, September 24-27: postponed due to WTC tragedy).

1999 Nitrogenase genes and marine fiazotrophs: New perspectives on nitrogen fixation in oligotrophic oceans. Gordon Conference on Applied and Environmental Microbiology. (Invited).

1999 Atmospheric deposition: Effects on marine, estuarine and freshwater systems. Special Session. American Society of Limnology and Oceanography Aquatic Sciences Meeting, Santa Fe, NM. (Organizor and Co-convenor).

1998 Distribution and diversity of nitrogen-fixing cyanobacteria in the open ocean and estuarine environments. International Society for Microbial Ecology, Halifax, Nova Scotia. (Co-convenor of Contributed Session).

1997 Molecular biology of nitrogen fixation in the marine cyanobacterium *Trichodesmium*. 3rd International Congress on Photosynthetic Prokaryotes, Vienna, Austria. (Invited Lecture).

1997 Atmospheric deposition in the Adirondacks: links between watersheds and lakewaters and implications for the future. American Chemical Society, North East Regional Meeting (NERM). (Invited).

1997 Molecular biological contributions to our understanding of biological communities. Special Session Aquatic Sciences Meeting of the American Society of Limnology and Oceanography. (Session Co-Organizer and Convenor).

1995 Nitrogen fixation in the marine environment. ASM New York Regional Meeting, Albany, NY. (Session Co-Convenor).

1995 Nitrogen fixation in the marine environment: relating genetic potential to activity. Symposium on Marine Biology: Molecular and Genetic Advances, Plymouth, England. (Invited).

1994 Nitrogen fixation in the sea: why Only *Trichodesmium*? NATO Advanced Workshop, Molecular Biology of Phytoplankton, Il Ciocco, Italy. (Invited).

1994 Nitrogen fixation genes: Probing biogeochemical cycles with molecular probes. American Society of Microbiology, Las Vegas, NV. (Session Co-Organizer and Convenor).

1992 Regulation of nitrogenase activity in natural populations of *Trichodesmium*: effects of light, oxygen, and the diel cycle. International Symposium on Microbial Ecology, Barcelona, Spain. (Session Co-Convenor).

1992 Detection and characterization of nitrogen fixation genes in the marine environment (Symposium on DNA in the Environment). American Society of Microbiology, New Orleans, LA. (Invited).

1992 Molecular biology of nitrogen fixation in microbial communities. (Symposium on Molecular Probes and Electrodes in Environmental Applications). ASLO Aquatic Sciences Meeting, Santa Fe, NM. (Invited).

1991 Molecular biology of nitrogen fixation in natural populations of marine cyanobacteria. NATO Advanced Workshop, Marine Diazotrophic Cyanobacteria, Hamburg, Germany. (Invited).

1990 Gene amplification and production of an antibody of nitrogenase of a marine cyanobacterium. Suncoast Biotech Conference, USF. (Invited)

PROFESSIONAL SOCIETIES

International Society for Microbial Ecology
Association for the Sciences of Limnology and Oceanography
American Academy of Microbiology
American Society for Microbiology
Phycological Society of America
American Association for the Advancement of Science
American Geophysical Union

EDITORIAL

2012-2022	Co- Editor for *Journal of Phycology (voted for second 5 year term by Society)*
2010-2020	Board of Reviewing Editors *Science*
2010-2020	Specialty Chief Editor for *Frontiers in Aquatic Microbiology*
2006-2008	Editorial Board Member for *Journal of Phycology*.
2000-2004	Associate Editor for *Limnology and Oceanography*, *American Society for Limnology and Oceanography* (approximately 24 manuscripts per year).
1998-2006	Editorial Board Member of *Applied and Environmental Microbiology* of the American Society for Microbiology.