CURRICULUM VITAE

Hans W. Paerl

Personal Data

Place of Birth:	Amsterdam, Netherlands	
Country of Citizenship:	United States of America	
Marital Status:	Married, two children	
Telephone:	(252) 726-6841, Ext. 133	FAX: (252) 726-2426
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Languages spoken:	English (fluent), Dutch (fluent), Spanish (conversational)	

Education

A.A. Biology-Biochemistry, College of San Mateo, California - 1967
B.S. Biological Sciences, University of California, Davis, California - 1969
Ph.D. Ecology-Limnology, University of California, Davis, California - 1973

Employment Record

1967-69 Staff Research Associate, Zoology Department, Univ. of California, Davis
1967-70 Teaching Assistant in Limnology and Oceanography, Zoology Department and Institute of Ecology, University of California, Davis
1971-73 Research Associate, Division of Environmental Studies and Tahoe Research Group
1973-75 Post-Doctoral Research Limnologist, Division of Environmental Studies, University of California, Davis
1975-77 Research Scientist (Limnologist-Microbiologist) Dept. of Scientific and Industrial Research, Taupo, New Zealand
1978 Visiting Scientist - Canada Centre for Inland Waters, Environment Canada
1978- William R. Kenan Professor of Marine and Environmental Sciences, Institute of Marine Sciences, UNC Chapel Hill
2017- Hohai Scholar, Hohai University, Nanjing, China

Honors, Awards, and Memberships

1969 B.S. degree with honors
1970-73 N.D.E.A. Title IV Graduate Fellowship
1973 Ph.D. degree with honors

Awards:
G. Evelyn Hutchinson Award, American Society of Limnology and Oceanography, 2003.
Odum Lifetime Achievement Award, Coastal and Estuarine Research Federation, 2011.
Chinese Academy of Sciences, Appointed Research Fellow, 2014
American Geophysical Union, Fellow, 2015
Visiting Professorship, Netherlands Royal Academy of Arts and Sciences, 2018-2019

Member: American Association for the Advancement of Science
American Society Limnology and Oceanography (Member at Large 1986-88, Editorial Board 1998-2002), Policy Committee (2000-2003), Associate Editor
Phycological Society of America, Editorial Board (1989-1991)
Applied and Environmental Microbiology, Editorial Board (1981-94)
Microbial Ecology, Editorial Board (1993-2003)
Netherlands Journal of Microbial Ecology, Editorial Board (1993-2003)
Ecological Society of America, Editorial Board (1997-03)
Environmental Microbiology, Editorial Board (1999-2006)
Estuaries and Coasts (Editorial Board (2010-Current)
Aquatic Ecology, Editorial Board (2009-Current)
Limnology and Oceanography (Associate Editor)

Related Activities

Consulting Scientist, Canada Centre for Inland Waters, Burlington, Ontario, Victoria, B.C., Canada. 1975.

Consulting Scientist, joint U.S.-Canadian oil pollution project (CEPEX), Victoria, B.C., Canada. 1975.

Participant, IBP-UNESCO Symposium: Sediment-Freshwater Interactions, Amsterdam, Holland. August 1976.

Consulting Scientist, Canada Centre for Inland Waters, Pacific and Yukon Region, Vancouver. 1978, 1980.

Consulting Scientist, National Water Research Institute, Burlington, Ontario, Canada. 1979, 1980.

Participant, Dept. of Energy-A.A.A.S. Workshop on "CO_2 in the Biosphere". Annapolis, Maryland. March 1979.

Member, Expert Advisory Panel, Potomac River Blue-green Algal Blooms. Jointly supported by U.S. EPA and District of Columbia Council of Governments. 1984.

Participant, UNESCO-Sea Grant Symposium: "Comparative Ecology of Freshwater and Coastal Marine Ecosystems." Nairobi, Kenya. September 1985.

Invited lecturer and seminar speaker (summer field and laboratory courses) W. K. Kellogg Biological Station, Michigan State Univ. July 1985.

Participant, NSF-BSR supported workshop on Great Lakes Research Initiatives. Univ. of Michigan. April 1986.

Participant, NSF-BSR supported workshop on Complex Trophic Interactions. Notre Dame Univ. March 1987.

Participant, NOAA Research Planning Group (1988-1993), Washington, DC - Easton, MD. May 1987.

Participant, 7th International Symposium on N_2 Fixation, Cologne, W. Germany. March 1988.

Invited Scientist (testimony), U.S. Senate (Committee on Commerce, Science and Transportation), Acid rain nitrogen impacts on marine waters. Washington, D. C. June 1988.

Chairman, ASLO-AGU meeting, San Francisco, CA. December 1988.

Organizer and Instructor, Marine Ecology course, Marine Biological Laboratory, Woods Hole, MA. July 1989.

Co-organizer (W. D. Millie - USDA), Phycological Society of America - US EPA Workshop, "Evaluations of Spectrophotometric, Fluorometric and HPLC Methods for Algal Pigment Determinations in Aquatic Ecosystems". Duke Univ., Durham, NC. September 1991.

Member, Expert Panel, Florida Bay Eutrophication Hearings, Key Largo, FL. August 1993.

Chief Scientist, R/V Cape Hatteras (NSF-UNOLS) cruises, 1993, 1994, 1995, 1998.

Participant, International Conference on Environmental Biotechnology, Braunschweig, Germany. September 1994.

Member, NSF Antarctic Research Team, Lake Bonney, McMurdo Dry Valleys. 1995, 1996.

Member, Sea Grant Review Teams, Maryland (1992, 1994), Rhode Island (1993), New York (1995).

Chair, Expert Panel, NC State Senate Committee on Water Quality and Fish Kills, Raleigh, NC. 1995-1996.

Keynote Speaker, 750th Anniversary of the Univ. of Rostock, Germany. October 1995.

Member, NOAA-EPA Site Visit Team, ARL/Oak Ridge, Research Triangle, NC. 1996.

Co-Chair, US-European Conference on Comparative Shallow Water Coastal Ecosystems, Rostock, Germany. August 1996.

Invited Lecture, Shared Resources: Airsheds and Watersheds Conference: "What are the Essential Elements to an East/Gulf Coast Assessment of Atmospheric Nitrogen Loads to Coastal Areas?". Raleigh, NC. March 1997.

Invited Keynote Lecturer. "Algal bloom dynamics in estuarine and coastal ecosystems: Synergistic physical-chemical controls of production and community composition." American Chemical Society meeting, San Francisco, CA. April 1997.

Invited Lecturer: Sustainable Biosphere Initiative (SBI) Workshop, "Atmospheric Deposition to Coastal Watersheds". Narragansett, RI. July 1997.

Keynote Lecture, "Role of microbial consortia in aquatic nitrogen and carbon cycling: New concepts and paradigms". Presented at the Max Planck Society Symposium on Microbial Ecology. Marburg, Germany. July 1997.

Participant, Senior Scientist, Collaborative US-Finnish cruises on the R/V Aranda, Baltic Sea. July 1997, July 1998.

Co-Chair, 4th Int. Conference on Toxic Cyanobacteria, Beaufort, NC. September 1998.

Chief Scientist, Collaborative US-Finnish cruise on the R/V Cape Hatteras, W. Atlantic Ocean. October, 1998.

Member, Florida Bay Expert Panel, 1999-2002.

Keynote Speaker, International Symposium on Marine Nitrogen Fixation, Marseille, France. Sept. 2000.

Invited Speaker, 7th International Symposium on Aquatic Microbial Ecology, Noordwykerhout, Netherlands, August, 2000

Member, Blue-Ribbon Panel: NOAA-EPA Presidential Panel on Coastal Nutrient Enrichment and Eutrophication. Washington, DC Sept. 2000.

Invited Speaker, 6th International Symposium for Microbial Ecology, Amsterdam, Netherlands, August, 2001.

Invited Lecture, Danish Environmental Protection Agency, Roskilde, Denmark.
Invited Speaker, National Academy of Sciences Symposium on Coastal Eutrophication. Sept., 2001.
Keynote Lecture, International Symposium on Estuarine Research, Hong Kong Technical University, Hong Kong, April, 2002.
Invited Lecture, European Phycological Symposium. Stockholm University, May, 2002.
Member, Sea Grant Review Team, Rhode Island Sea Grant Program (Sept. 2002).
Member, EPA Site Review Team, Gulf Breeze Laboratory, FL (Sept. 2002).
Keynote Lecture, 8th International Symposium on Aquatic Microbial Ecology, Taormina, Italy. Oct., 2002.
Member, Scientific Oversight Panel, Florida Bay Program Symposium, Clearwater, FL, April, 2003.
Invited Lecture, NADP Long-term Monitoring/Support Science Workshop, Washington, DC, Oct. 2003.
Plenary Lecture, Estuarine Indicator Workshop, Sanibel Island, FL., October, 2003.
Member, EPA Site Review Team, Alabama Center for Estuarine Studies, Dauphin Island Sea Lab, AL, Jan., 2004.
Member, EPA Oversight Panel, Gulf of Mexico Hypoxia Study & Report.
Keynote Lecture, 6th Inter.Soc.Aquat. Microbiol.Symp.Helsinki, Finland, August, 2005.
Kenote Lecture, EPA Int. CyanoHAB Symp., Research Triangle Pk., NC, Sept. 2005.
Member, EPA Science Advisory Board, Gulf of Mexico Hypoxia, 2005-2008.
Organizer, US-China Large Lakes CyanoHAB Conf., Morehead City, NC March, 2007.
Member, EPA Science Advisory Board, Integrated Nitrogen Panel 2006-current.
Keynote Lecturer, 6th International Toxic Cyanobacteria Conference, Rio de Janeiro, Brazil, Sept. 2008.
Keynote Lecturer, SIL Special Large Lake Symposium, Nanjing, China, Oct. 2009.
Keynote Lecture, Gordon Conference on Oceans and Human Health, Univ. of New England, Biddleford, ME, June, 2010.
Co-organizer, 7th International Toxic Cyanobacteria Conference, Istanbul,Turkey, Sept.2010.
Co-Chair, SCOR Working Group 137, Coastal Phytoplankton Dynamics. 2010-present.
Keynote Lecture, Coastal and Estuarine Research Federation Meetings, Daytona Beach, FL, Oct. 2011.
Keynote Lecture, International Limnological Society Symposium, Nanjing China, Oct. 2012
Keynote Lecture, American Society for Remote Sensing Meeting, Baltimore, MD, March, 2013
Keynote Lecture, 5th FerryBox Workshhop, Helsinki, Finland, April, 2013
Keynote Lecture, American Society for Microbiology, Denver, CO, May, 2013
Keynote Lecture, Estuarine, Coastal Shelf Science Conference, Shanghai, China, Oct., 2013
Member, Scientific Committee, UNESCO-IHP Initiat. Water Quality, Kyoto, Japan, July, 2015
Invited Lecture, 5th International Ecosummit, Montpellier, France, Sept., 2016
Invited lecture, 10th International Conference on Toxic Cyanobacteria, Wuhan, China, Oct. 2016
Co-Chair (with K. Yin), Intergovernmental Oceanographic Commission (IOC), Working Group on Effects of Human and Climatically-induced Changes in Coastal Phytoplankton, Oct., 2016-current.
Chair, Global Trends of Phytoplankton in the Oceans, 1st Conference, Zhuhai, China, Dec., 2016
Member, EPA Integrated Science Assessment for Oxides of Nitrogen, Oxides of Sulfur, and Particulate Matter Ecological Criteria, Scientific Advisory Board. 2016-

Ph.D. Dissertation

1973. The regulation of heterotrophic activity by environmental factors at Lake Tahoe, California-Nevada. University of California, Davis. 139 p.

Publications

Paerl, H. W. and C. R. Goldman. 1972. Heterotrophic assays in the detection of water masses at Lake Tahoe, California. Limnol. Oceanogr. 17:145-148.

Paerl, H. W. and C. R. Goldman. 1972. Stimulation of heterotrophic and autotrophic activities of a planktonic microbial community by siltation at Lake Tahoe, California. Mem. Ist. Ital. Idrobiol. 29 Suppl.:129-147.

Holm-Hansen, O. and H. W. Paerl. 1972. The applicability of ATP determination for estimation of microbial biomass and metabolic activity. Mem. Ist. Ital. Idrobiol. 29 Suppl.:149-168.

Paerl, H. W. 1973. Detritus in Lake Tahoe: Structural modification by attached micro-flora. Science 180:496-498.

Paerl, H. W. and S. L. Shimp. 1973. Preparation of filtered plankton and detritus for study with scanning electron microscopy. Limnol. Oceanogr. 18:802-805.

Goldman, C. R., R. C. Richards, H. W. Paerl, R. C. Wrigley, V. R. Obereck and W. L. Quade. 1974. Limnological studies and remote sensing of the Upper Truckee River sediment plume in Lake Tahoe, California-Nevada. Remote Sens. Environ. 3:49-67.

Deamer, D. W., R. L. Leonard, H. W. Paerl and C. R. Goldman. 1974. Gambling at Lake Tahoe: The environmental stakes. Nat. Hist. Jan. 1975, pp. 65-72.

Paerl, H. W. 1974. Bacterial uptake of dissolved organic matter in relation to detrital aggregation in marine and freshwater systems. Limnol. Oceanogr. 19:966-972.

Paerl, H. W., R. C. Richards, R. L. Leonard and C. R. Goldman. 1975. Seasonal nitrate cycling as evidence for complete vertical mixing in Lake Tahoe, California- Nevada. Limnol. Oceanogr. 20:1-8.

Paerl, H. W. 1975. Microbial attachment to particles in marine and freshwater ecosystems. Microb. Ecol. 2:73-83.

Paerl, H. W., R. D. Thomson and C. R. Goldman. 1975. The ecological significance of detritus formation during a diatom bloom in Lake Tahoe, California-Nevada. Verh. Int. Verein. Limnol. 19:826-834.

Paerl, H. W. 1975. Techniques for evaluating ATP as an indicator of aquatic microbial biomass. ATP Methodology Seminar, San Diego, California, March 3-5, 1:426-444.

Paerl, H. W. 1976. Specific associations of the blue-green algae *Anabaena* and *Aphanizomenon* bacteria in freshwater blooms. J. Phycol. 12:431-435.

Carlucci, A. F., S. L. Shimp, P. A. Jumars and H. W. Paerl. 1976. *In situ* morphologies of deep sea and sediment bacteria. Can. J. Microbiol. 22:1667-1671.

Paerl, H. W. and N. J. Williams. 1976. The relation between adenosine triphosphate and microbial biomass in diverse aquatic ecosystems. Int. Rev. Gesamten Hydrobiol. 61:659-664.

Paerl, H. W., M. M. Tilzer and C. R. Goldman. 1976. Chlorophyll *a* versus adenosine triphosphate as algal biomass indicators in lakes. J. Phycol.12:242-246.

Paerl, H. W. and D. R. S. Lean. 1976. Visual observations of phosphorus movement between algae, bacteria, and abiotic particles in lake waters. J. Fish. Res. Board Can. 12:2805-2813.

Paerl, H. W. and A. L. Mackenzie. 1977. A comparative study of the diurnal carbon fixation patterns of nannoplankton and netplankton. Limnol. Oceanogr. 22:732-738.

Paerl, H. W. 1977. Ultraphytoplankton biomass and production in some New Zealand lakes. N.Z. J. Mar. Freshwater Res. 11:297-305.

Tilzer, M. M., H. W. Paerl and C. R. Goldman. 1977. Sustained viability of aphotic phytoplankton in Lake Tahoe (California-Nevada). Limnol. Oceanogr. 22:84-91.

Paerl, H. W. 1978. Microbial carbon recovery in aquatic ecosystems. Limnol. Oceanogr. 23:927-935.

Paerl, H. W. 1978. Effectiveness of various counting methods in detecting viable phytoplankton. N.Z. J. Mar. Freshwater Res. 12:67-72.

Paerl, H. W. and P. E. Kellar. 1978. Optimization of N_2 fixation of O_2 rich waters. pp. 68-75, *in* Proc. 1st Intern. Microbial Ecology Symp., Dunedin, New Zealand. Springer-Verlag.

Paerl, H. W. 1978. Light-mediated recovery of N_2 fixation in the blue-green algae *Anabaena* spp. in O_2 supersaturated waters. Oecologia (Berl.) 32:135-139.

Paerl, H. W. and P. E. Kellar. 1978. Significance of bacterial (Cyanophyceae) *Anabaena* associations with respect to N_2 fixation in freshwater. J. Phycol. 14:254-260.

Paerl, H. W. 1978. Bacterial sediment formation in lakes: Trophic implications. pp. 40-47, i*n* H. L. Golterman (ed.), Symposium on Sediment-Freshwater Interactions. J. W. Junk Publ., The Hague, Holland.

Paerl, H. W. 1978. Role of heterotrophic bacteria in promoting N_2 fixation by *Anabaena* in aquatic habitats. Microb. Ecol. 4:215-231.

Downes, M. T. and H. W. Paerl. 1978. The separation of two dissolved reactive phosphorus fractions in lake water. J. Fish. Res. Board Can. 35:1636-1639.

Paerl, H. W. and M. T. Downes. 1978. Biological availability of low versus high molecular weight reactive phosphorus. J. Fish. Res. Board Can. 35:1639-1643.

Paerl, H. W. 1978. Nannoplankton vs. netplankton photosynthetic and heterotrophic activities in Fijian waters of the South Pacific Ocean. *In* M. Cresswell (ed.), Proc. Royal Society South Pacific Expedition, June-July 1977. R. Soc. N. Z. Bull. 17:211-221.

Paerl, H. W. and P. E. Kellar. 1978. The microbiology of the Purari River Delta, Papua, New Guinea. A report to the Govt. of Papua, New Guinea Office of Conservation and Environment. 29 pp.

Paerl, H. W., G. W. Payne, L. A. Mackenzie, P. E. Kellar and M. T. Downes. 1979. Limnology of nine Westland beech forest lakes. N.Z. J. Mar. Freshwater Res. 13:47-57.

Paerl, H. W. 1979. Optimization of carbon dioxide and nitrogen fixation by the blue-green alga *Anabaena* in freshwater blooms. Oecologia (Berl.) 38:275-290.

Paerl, H. W. 1979. Study of the importance of nitrogen fixation to the growth of *Myriophyllum spicatum* (Eurasian millfoil). Report National Water Research Institute, Burlington, Ontario, Canada. 39 pp.

Paerl, H. W. and P. E. Kellar. 1979. Nitrogen-fixing *Anabaena*: Physiological adaptations instrumental in maintaining surface blooms. Science 204:620-622.

Paerl, H. W. and E. A. Stull. 1979. In defense of grain density autoradiography. Limnol. Oceanogr. 24:1166-1169.

Paerl, H. W. 1980. Chpt. 11. Attachment of microorganisms to living and detrital surfaces in freshwater systems. pp. 375-402, *in* G. Bitton and K. C. Marshall (eds.), Adsorption of Microorganisms to Surfaces. John Wiley & Sons, N. Y.

Rosenberg, G. and H. W. Paerl. 1980. Nitrogen fixation by blue-green algae associated with the siphonous green seaweed *Codium decorticatum*: Effects on ammonium uptake. Mar. Biol. 61:151-158.

Paerl, H. W. 1980. Ecological rationale for H_2-metabolism during aquatic blooms of the cyanobacterium *Anabaena*. Oecologia (Berl.) 47:43-45.

Kellar, P. E. and H. W. Paerl. 1980. Physiological adaptations in response to environmental stress during an N_2-fixing *Anabaena* bloom. Appl. Environ. Microbiol. 40:587-595.

Paerl, H. W., K. L. Webb and W. J. Weibe. 1981. Nitrogen fixation in waters. pp. 193-241, *in* W. J. Broughton (ed.), The Ecology of Nitrogen Fixation. Oxford Univ. Press, Oxford.

Wellman, A. M. and H. W. Paerl. 1981. Rapid chemotaxis assay using radioactively labeled bacterial cells. Appl. Environ. Microbiol. 42:216-221.

Shindler, D. B., H. W. Paerl, P. E. Kellar and D.R.S. Lean. 1981. Environmental constraints on *Anabaena* N_2- and CO_2-fixation: Effects of hyperoxia and phosphate depletion on blooms and chemostat cultures. pp. 221-229, *in* J. Barica and L. R. Mur (eds.). Developments in Hydrobiology, Vol. 2. W. Junk b.v. Publ., The Hague, The Netherlands.

Paerl, H. W. 1982. Chpt. 17. Interactions with bacteria. pp. 441-461, *in* N. G. Carr and B. A. Whitton (eds.), The Biology of Cyanobacteria. Blackwell Sci. Publ. Ltd., Oxford.

Paerl, H. W. and J. Ustach. 1982. Blue-green algal scums: An explanation for their occurrence during freshwater blooms. Limnol. Oceanogr. 27:212-217.

Paerl, H. W. and S. M. Merkel. 1982. Differential phosphorus assimilation in attached vs. unattached microorganisms. Arch. Hydrobiol. 93:125-134.

Paerl, H. W. 1982. Factors limiting productivity of freshwater ecosystems. Adv. Microb. Ecol. 6:75-110.

Paerl, H. W. 1982. The feasibility of ^{55}Fe autoradiography as performed on N_2 fixing *Anabaena* spp. populations and associated bacteria. Appl. Environ. Microbiol. 43:210-217.

Paerl, H. W. and P. T. Bland. 1982. Localized tetrazolium reduction in relation to N_2 fixation, CO_2 fixation and H_2 uptake in aquatic filamentous cyanobacteria. Appl. Environ. Microbiol. 43:218-226.

Paerl, H. W. 1982. Environmental factors promoting and regulating N_2 fixing blue-green algal blooms in the Chowan River, N. C. Univ. of North Carolina Water Resources Research Institute Report No. 176. 65 pp.

Paerl, H. W. 1982. *In situ* H_2 production and utilization by natural populations of N_2-fixing blue-green algae. Can. J. Bot. 60:2542-2546.

Paerl, H. W. 1982. Partitioning of CO_2 fixation in the colonial cyanobacterium *Microcystis aeruginosa*: Mechanism promoting formation of surface scums. Appl. Environ. Microbiol. 46:252-259.

Gallucci, K. and H. W. Paerl. 1983. *Pseudomonas aeruginosa* chemotaxis associated with blooms of N_2-fixing blue-green algae (Cyanobacteria). Appl. Environ. Microbiol. 45:557-561.

Paerl, H. W. 1983. The effects of salinity on the potential of a blue-green algal (*Microcystis aeruginosa*) bloom in the Neuse River Estuary, NC. N. C. Sea Grant Report. 84 pp.

Paerl, H. W. 1983. Environmental regulation of H_2 utilization ($^3H_2$ exchange) among natural and laboratory populations of N_2 and non N_2-fixing phytoplankton. Microb. Ecol. 9:79-97.

Paerl, H. W., J. Tucker and P. T. Bland. 1983. Carotenoid enhancement and its role in maintaining blue-green algal (*Microcystis aeruginosa*) surface blooms. Limnol. Oceanogr. 28:847-857.

Paerl, H. W. 1983. Factors regulating nuisance blue-green algal bloom potentials in the lower Neuse River, NC. Univ. North Carolina Water Resources Research Institute Report No. 188. 48 pp.

Paerl, H. W. 1984. An evaluation of freeze-fixation as a phytoplankton preservation method for microautoradiography. Limnol. Oceanogr. 29:417-426.

Paerl, H. W. 1984. Cyanobacterial carotenoids: their roles in maintaining optimal photosynthetic production among aquatic bloom forming genera. Oecologia 61:143-149.

Paerl, H. W. 1984. N_2 fixation (nitrogenase activity) attributable to a specific *Prochloron* (Prochlorophyta) - ascidian association in Palau, W. Micronesia. Mar. Biol. 81:251-254.

Paerl, H. W., R. A. Lewin and L. Cheng. 1984. Variations in chlorophyll and carotenoid pigmentation among *Prochloron* (Prochlorophyta) symbionts in diverse marine ascidians. Bot. Mar. 27:257-264.

Paerl, H. W. 1984. Transfer of N_2 and CO_2 fixation products from *Anabaena oscillarioides* to associated bacteria during inorganic carbon sufficiency and deficiency. J. Phycol. 20:600-608.

Paerl, H. W. 1984. Alteration of microbial metabolic activities in association with detritus. Proc. 2nd Intl. Conf. on Detritus in Aquatic Ecosystems. Bull. Mar. Sci. 35:393-408.

Paerl, H. W. and K. K. Gallucci. 1985. Role of chemotaxis in establishing a specific nitrogen-fixing cyanobacterial-bacterial association. Science 227:647-649.

Paerl, H. W., P. T. Bland, N. D. Bowles and M. E. Haibach. 1985. Adaptation to high intensity, low wavelength light among surface blooms of the cyanobacterium *Microcystis aeruginosa*. Appl. Environ. Microbiol. 49:1046-1052.

Paerl, H. W. 1985. Enhancement of marine primary production by nitrogen-enriched acid rain. Nature 316:747-749.

Bautista, M. F. and H. W. Paerl. 1985. Diel N_2 fixation in an intertidal marine cyanobacterial mat community. Mar. Chem. 16:369-377.

Bowles, N. D., H. W. Paerl and J. Tucker. 1985. Effective solvents and extraction periods employed in phytoplankton carotenoid and chlorophyll determinations. Can. J. Fish. Aquat. Sci. 42:1127-1131.

Paerl, H. W. 1985. Microzone formation: its role in the enhancement of aquatic N_2 fixation. Limnol. Oceanogr. 30:1246-1252.

Paerl, H. W. 1985. Chpt. 13. Influence of attachment on microbial metabolism and growth in aquatic ecosystems. pp. 363-400, *in* D. C. Savage and M. M. Fletcher (eds.), Bacterial Adhesion: Mechanisms and Physiological Significance. Plenum Press, New York.

Ter Steeg, P., P. J. Hanson and H. W. Paerl. 1986. Growth-limiting quantities and accumulation of molybdenum in *Anabaena oscillarioides* (Cyanobacteria). Hydrobiologia 140:143-147.

Fulton, R. S. and H. W. Paerl. 1987. Effects of colonial morphology on zooplankton utilization of algal resources during blue-green algal (*Microcystis aeruginosa*) blooms. Limnol. Oceanogr. 32:634-644.

Paerl, H. W. and N. D. Bowles. 1987. Dilution bioassays: Their application to assessments of nutrient limitation in hypereutrophic waters. Hydrobiologia 146:265-273.

Paerl, H. W., K. M. Crocker and L. E. Prufert. 1987. Limitation of N_2 fixation in coastal marine waters: relative importance of molybdenum, iron, phosphorus and organic matter availability. Limnol. Oceanogr. 32:525-536.

Paerl, H. W. and L. E. Prufert. 1987. Oxygen-poor microzones as potential sites of microbial N_2 fixation in nitrogen-depleted aerobic marine waters. Appl. Environ. Microbiol. 53:1078-1087.

Fulton, R. S. and H. W. Paerl. 1987. Toxic and inhibitory effects of the blue-green alga *Microcystis aeruginosa* on herbivorous zooplankton. J. Plankton Res. 9:837-855.

Bebout, B., H. W. Paerl, K. M. Crocker and L. E. Prufert. 1987. Diel interactions of oxygenic photosynthesis and N_2 fixation (acetylene reduction) in a marine microbial mat community. Appl. Environ. Microbiol. 53:2353-2362.

Paerl, H. W. 1987. Dynamics of blue-green algal (*Microcystis aeruginosa*) blooms in the lower Neuse River, North Carolina: causative factors and potential controls. Univ. North Carolina Water Resources Research Institute Report No. 229. 164 p.

Fulton, R. S. and H. W. Paerl. 1988. Effects of the blue-green alga *Microcystis aeruginosa* on zooplankton competitive relations. Oecologia 76:383-389.

Lung, W. and H. W. Paerl. 1988. Modeling blue-green algal blooms in the lower Neuse River. Water Research 22:895-905.

Paerl, H. W. 1988. Nuisance phytoplankton blooms in coastal, estuarine, and inland waters. Limnol. Oceanogr. 33:823-847.

Paerl, H. W. 1988. Growth and reproductive strategies of freshwater (cyanobacteria) blue-green algae. pp. 261-315, *in* C. D. Sandgren (ed.), Growth and reproductive strategies of freshwater phytoplankton. Cambridge University Press.

Paerl, H. W. and B. M. Bebout. l988. Direct measurement of O_2-depleted microzones in marine *Oscillatoria*: Relation to N_2 fixation. Science 241:442-445.

Paerl, H. W., B. M. Bebout and L. E. Prufert. 1988. Physiological ecology and environmental control of N_2 fixation in marine and freshwater microbial associations. pp. 711-716, *in* H. Bothe (ed.), Proc. 7th Intl. Congress on N_2 fixation, Cologne, W. Germany. Springer Verlag, W. Germany.

Paerl, H. W., B. M. Bebout and L. E. Prufert. 1988. Naturally-occurring patterns of oxygenic photosynthesis and N_2 fixation in a marine microbial mat: physiological and ecological ramifications. pp. 326-341, *in* Y. Cohen and J. Rosenberg (eds.), Proc. 2nd Intl. Symp. on Microbial Mats, Eilat, Israel. ASM Publications.

Paerl, H. W. and R. G. Carlton. 1988. Control of nitrogen fixation by oxygen depletion in surface-associated microzones. Nature 332:260-262.

Porter, K.G., H. Paerl, R. Hodson, M. Pace, J. Priscu, B. Riemann, D. Scavia, and J. Stockner. 1988. Chapter 13, Microbila Interactions in Lake Food Webs. In: S.R. Carpenter, Ed. Complex Interactions in Lake Communities. Springer-Verlag, New York, NY,

Palumbo, A. V., F. K. Pfaender and H. W. Paerl. 1988. Biodegradation of NTA and m-cresol in coastal environments. Environmental Toxicology and Chemistry 7:573-585.

Carlton, R. G. and H. W. Paerl. 1989. Oxygen-induced changes in morphology of aggregates of *Aphanizomenon flos aquae* (Cyanophyceae): Implications for nitrogen fixation potentials. J. Phycology 25:326-333.

Paerl, H. W., B. M. Bebout and L. E. Prufert. 1989. Bacterial associations with marine *Oscillatoria* sp. (*Trichodesmium* sp.) populations: ecophysiological implications. J. Phycology 25:773-784.

Paerl, H. W., B. M. Bebout, L. E. Prufert and C. A. Currin. 1989. Mediation of aquatic N_2 fixation potentials by O_2-depleted microzones. pp. 113-117, *in* Proc. 5th Intl. Symposium on Microbial Ecology, Kyoto, Japan, 28 August 1989.

Paerl, H. W., J. C. Priscu and D. L. Brawner. 1989. Immunochemical localization of nitrogenase in marine *Trichodesmium* aggregates: relationship to N_2 fixation potential. Appl. Environm. Microbiol. 55:2965-2975.

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