

## Publications - DAVID M. WARD

### Original Peer-reviewed Articles

Kern, E.A., W.P. Inskeep and D.M. Ward. Influence of nonaqueous phase liquids on the kinetics of phenanthrene degradation and microbial populations selection (in prep)

Bedard, D.L, M. Bateson , U. Nübel, G.V.S. Jerzak and D.M. Ward. Survey of green sulfur bacteria in Yellowstone National Park thermal springs (in prep)

Jerzak, G.V.S., U. Nübel, M. Bateson, D.M. Ward and D.L. Bedard. Unexpected 16S rRNA sequence diversity in green sulfur bacteria found in Yellowstone National Park thermal springs. (in prep)

Colores, G., W.P. Inskeep and D.M. Ward. Competitive fitness of isolates enriched with variations in contaminant bioavailability (in prep.)

Kern, E.A., W.P. Inskeep and D.M. Ward. Molecular evidence for ecological succession during the microbial degradation of crude oil and synthetic hydrocarbon mixtures (in prep)

van der Meer, M.T.J., S. Schouten, M.M. Bateson, U. Nübel , J.W. de Leeuw, J.S. Sinninghe-Damsté and D.M. Ward. Diel cycling of polyglucose and its influence on the stable carbon isotope patterning of cyanobacterial and green nonsulfur-like bacterial lipids in a hot spring microbial mat. (in prep)

Hamamura, N., S.H. Olson, D.M. Ward, and W.P. Inskeep Characterization of microbial population and functional gene diversity during crude-oil biodegradation in soil environments. (in prep)

Kühl, M., A. Wieland, M.J. Ferris, and D.M. Ward. Microenvironmental patterns of optical properties, oxygen and oxygenic photosynthesis with temperature and depth in a hot spring *Synechococcus* mat. (in prep.)

M.J. Ferris, M. Kühl, and D.M. Ward. Patterns of SSU rRNA and intervening transcribed spacer variation with temperature and depth in a hot spring *Synechococcus* mat. (in prep.)

van der Meer, M.T.J., S. Schouten, M.M. Bateson, U. Nübel , J.W. de Leeuw, J.S. Sinninghe-Damsté, D.M. Ward and M.T. Madigan. Lipid biomarkers in *Roseiflexus* spp. strains typical of those those predominating in the alkaline siliceous hot spring microbial mat communities (in prep)

TBD (NSF FIBR team plus many others), Genome sequences of two thermophilic *Synechococcus* ecotypes from a hot spring mat community reveal adaptive strategies and a remarkable lack of synteny (in prep.)

Hamamura, N, S.H. Olson, D.M. Ward, and W.P. Inskeep<sup>1,2\*</sup> Diversity and Functional Analysis of Bacterial Communities Associated with Natural Hydrocarbon Seeps in Acidic Soils at Rainbow Springs, Yellowstone National Park (in prep.)

Allewalt, J.P., M.M. Bateson, N.P. Revsbech, K. Slack and D.M. Ward. Effect of temperature and light on growth and photosynthesis of *Synechococcus* isolates typical of those predominating in the Octopus Spring microbial mat community. (submitted)

van der Meer, M.T.J., S. Schouten, M.M. Bateson, U. Nübel , A. Wieland, M. Kühl, J.W. de Leeuw, J.S. Sinninghe-Damsté and D.M. Ward. 2005. Temporal variations in phototrophic carbon metabolisms in alkaline silicious hot spring microbial mats from Yellowstone National Park, U.S.A. Appl. Environ. Microbiol. (in press)

- van der Meer, M.T.J., S. Schouten, J.S. Sinninghe-Damsté, J.W. de Leeuw and D.M. Ward. 2003. Compound-specific isotopic fractionation patterns suggest different carbon metabolisms among *Chloroflexus*-like bacteria in hot spring microbial mats. *Appl. Environ. Microbiol.* 69:6000-6006.
- Papke, R.T., N.B. Ramsing, M.M. Bateson and D.M. Ward. 2003. Geographical isolation in hot spring cyanobacteria. *Environ. Microbiol.* 5:650-659.
- M.J. Ferris, M. Kühl, A. Wieland and D.M. Ward. 2003. Different light-adapted ecotypes in a 68°C *Synechococcus* mat community revealed by analysis of 16S-23S intervening transcribed spacer variation. *Appl. Environ. Microbiol.* 69:2893-2898.
- Nübel, U., M.M. Bateson, V. Vandieken, M. Kühl and D. M. Ward. 2002. Microscopic examination of distribution and phenotypic properties of phylogenetically diverse *Chloroflexaceae*-related bacteria in hot spring microbial mats. *Appl. Environ. Microbiol.* 68:4593-4603.
- van der Meer, M.T.J., S. Schouten, S. Hanada, E.C. Hopmans, J. S. Sinninghe Damsté and D.M. Ward. 2002. Alkane-1,2-diol based glycosides and fatty glycosides in *Roseiflexus castenholzii* and hot spring microbial mats. *Arch. Microbiol.* 178:229-237.
- Nübel U., M.M. Bateson, M.T. Madigan, M. Kühl and D.M. Ward. 2001. Diversity and distribution in hypersaline microbial mats of bacteria related to *Chloroflexus* spp. *Appl Environ Microbiol.* 67:4365-71.
- van der Meer MTJ, Schouten S, van Dongen BE, Rijpstra WIC, Fuchs G, Sinninghe Damsté JS, de Leeuw JW, Ward DM (2001) Biosynthetic controls on the <sup>13</sup>C-contents of organic components in the photoautotrophic bacterium *Chloroflexus aurantiacus*. *J Biol Chem* 276: 10971-10976.
- van der Meer, M.T.J., S. Schouten, J.W. de Leeuw and D.M. Ward. 2000. Autotrophy of green non-sulphur bacteria in hot spring microbial mats: biological explanations for isotopically heavy organic carbon in the geological record. *Env. Microbiol.* 2:428-435. [cover photo]
- Grosser, R.J., M. Friedrich, D.M. Ward and W.P. Inskeep. 2000. Effect of model sorptive phases on phenanthrene biodegradation: different enrichment conditions influence bioavailability and selection of phenanthrene-degrading isolates *Appl. Environ. Microbiol.* 66:2695-2702.
- Friedrich, M., R.J. Grosser, E.A. Kern, W.P. Inskeep and D.M. Ward. 2000. Effect of model sorptive phases on phenanthrene biodegradation: molecular analysis of enrichments and isolates suggests selection based on bioavailability. *Appl. Environ. Microbiol.* 66:2703-2710.
- Colores, G.M., R.E. Macur, D.M. Ward and W.P. Inskeep. 2000. Molecular analysis of surfactant driven microbial population shifts in hydrocarbon-contaminated soil. *Appl. Environ. Microbiol.* 66:2959-2964.
- Ramsing, N.B., M.J. Ferris and D.M. Ward. 2000. Highly ordered vertical structure of *Synechococcus* populations within the one-millimeter thick photic zone of a hot spring cyanobacterial mat *Appl. Environ. Microbiol.* 66:1038-1049.
- van der Meer, M.T.J., S. Schouten, D.M. Ward, J.A.J. Geenevasen and J.S. Sinninghe Damste. 1999. All-*cis* hentriaconta-9,15,22-triene in microbial mats formed by the phototrophic prokaryote *Chloroflexus*. *Organic Geochemistry* 30:1585-1587.

- Ferris, M.J. S.C. Nold, N.P. Revsbech and D.M. Ward. 1997. Population structure and physiological changes within a hot spring microbial mat community following disturbance. *Appl. Environ. Microbiol.* 63:1367-1374.
- Ramsing, N.B., M.J. Ferris and D.M. Ward. 1997. Light-induced motility of thermophilic *Synechococcus* isolates from Octopus Spring, Yellowstone National Park. *Appl. Environ. Microbiol.* 63:2347-2354.
- Ferris, M.J. and D.M. Ward. 1997. Seasonal distributions of dominant 16S rRNA-defined populations in a hot spring microbial mat examined by denaturing gradient gel electrophoresis. *Appl. Environ. Microbiol.* 63:1375-1381.
- Ward, D.M., C.M. Santegoeds, S.C. Nold, N.B. Ramsing, M.J. Ferris and M.M. Bateson. 1997. Biodiversity within hot spring microbial mat communities: molecular monitoring of enrichment cultures. *Antonie van Leeuwenhoek* 71:143-150.
- Nold, S.C. and D.M. Ward. 1996. Photosynthate partitioning and fermentation in hot spring microbial mat communities. *Appl. Environ. Microbiol.* 62:4598-4607.
- Ferris, M.J., A.L. Ruff-Roberts, E.D. Kocczynski, M.M. Bateson and D.M. Ward. 1996. Enrichment culture and microscopy conceal diverse thermophilic *Synechococcus* populations in a single hot spring microbial mat habitat. *Appl. Environ. Microbiol.* 62:1045-1050.
- Santegoeds, C.M., S.C. Nold and D.M. Ward. 1996. Denaturing gradient gel electrophoresis used to monitor the enrichment culture of aerobic chemoorganotrophic bacteria from a hot spring cyanobacterial mat. *Appl. Environ. Microbiol.* 62:3922-3928.
- Nold, S.C., E.D. Kocczynski and D.M. Ward. 1996. Cultivation of aerobic chemoorganotrophic Proteobacteria and Gram-positive bacteria from a hot spring microbial mat. *Appl. Environ. Microbiol.* 62:3917-3921.
- Ferris, M.J., G. Muyzer and D.M. Ward. 1996. Denaturing gradient gel electrophoresis profiles of 16S rRNA-defined populations inhabiting a hot spring microbial mat community. *Appl. Environ. Microbiol.* 62:340-346.
- Nold, S.C. and D.M. Ward. 1995. Diverse *Thermus* species inhabit a single hot spring microbial mat. *System. Appl. Microbiol.* 18:274-278.
- Robison-Cox, J., M.M. Bateson and D.M. Ward. 1995. Evaluation of nearest-neighbor methods of detection of chimeric small-subunit rRNA sequences. *Appl. Environ. Microbiol.* 61:1240-1245.
- Ruff-Roberts, A.L., J.G. Kuenen and D.M. Ward. 1994. Distribution of cultivated and uncultivated cyanobacteria and *Chloroflexus*-like bacteria in hot spring microbial mats. *Appl. Environ. Microbiol.* 60:697-704.
- Kocczynski, E.D., M.M. Bateson and D.M. Ward. 1994. Recognition of chimeric small-subunit ribosomal RNA sequences composed of genes from uncultivated microorganisms. *Appl. Environ. Microbiol.* 60:746-748.
- Ward, D.M., S. Panke, K.D. Kloeppel, R. Christ and H. Fredrickson. 1994. Complex polar lipids of a hot spring cyanobacterial mat and its cultivated inhabitants. *Appl. Environ. Microbiol.* 60:3358-3367.

- Weller, R., M.M. Bateson, B.K. Heimbuch, E.D. Kopczynski and D.M. Ward. 1992. Uncultivated cyanobacteria, *Chloroflexus*-like inhabitants, and spirochete-like inhabitants of a hot spring microbial mat. *Appl. Environ. Microbiol.* 58:3964-3969.
- Zeng, Y.B., D.M. Ward, S. Brassell and G. Eglinton. 1992. Biogeochemistry of hot spring environments. 2. Lipid compositions of Yellowstone (Wyoming, U.S.A.) cyanobacterial and *Chloroflexus* mats. *Chem. Geol.* 95:327-345.
- Zeng, Y.B., D.M. Ward, S. Brassell and G. Eglinton. 1992. Biogeochemistry of hot spring environments. 3. Apolar and polar lipids in the biologically active layers of a cyanobacterial mat. *Chem. Geol.* 95:347-360.
- Weller, R., F.W. Weller and D.M. Ward. 1991. 16S rRNA sequences retrieved as randomly primed cDNA from a hot spring cyanobacterial mat community. *Appl. Environ. Microbiol.* 57:1146-1151.
- Shiea, J., S. Brassell and D.M. Ward. 1991. Comparative analysis of free lipids in hot spring cyanobacterial and anoxygenic photosynthetic bacterial mats. *Org. Geochem.* 17:309-319.
- Bateson, M.M., K. Thibault and D.M. Ward. 1990. Comparative analysis of partial 16S ribosomal RNA sequences of *Thermus* species. *System. Appl. Microbiol.* 13: 8-13.
- Shiea, J., S. Brassell and D.M. Ward. 1990. Mid-chain branched mono- and dimethylalkanes in hot spring cyanobacterial mats: a direct biogenic source for branched alkanes in ancient sediments. *Org. Geochem.* 15:223-231.
- Ward, D.M., R. Weller and M.M. Bateson. 1990. 16S rRNA sequences reveal uncultured inhabitants of a well-studied thermal community. *FEMS Microbiology Rev.* 75:105-116.
- Ward, D.M., Weller, R. and M.M. Bateson. 1990. 16S rRNA sequences reveal numerous uncultured microorganisms in a natural community. *Nature* 345: 63-65.
- Weller, R. and D.M. Ward. 1989. Selective recovery of 16S ribosomal RNA sequences from natural microbial communities in the form of cDNA. *Appl. Environ. Microbiol.* 55: 1818-1822.
- Bateson, M.M., J. Wiegel and D.M. Ward. 1989. Comparative analysis of 16S ribosomal RNA sequences of thermophilic fermentative bacteria isolated from hot spring cyanobacterial mats. *System. Appl. Microbiol.* 12:1-7.
- Dobson, G., D.M. Ward, N.R. Robinson, and G. Eglinton. 1988. Biogeochemistry of hot spring environments: free lipids of a cyanobacterial mat. *Chem. Geol.* 68:155-179.
- Bateson, M.M., and D.M. Ward. 1988. Photoexcretion and consumption of glycolate in a hot spring cyanobacterial mat. *Appl. Environ. Microbiol.* 54:1738-1743.
- Summons, R. E., S. C. Brassell, G. Eglinton, E. Evans, R. J. Horodyski, N. Robinson, and D. M. Ward. 1988. Distinctive hydrocarbon biomarkers from fossiliferous sediment of the Late Proterozoic Walcott Member, Chuar Group, Grand Canyon, Arizona. *Geochim. Cosmochim. Acta* 52:2625-2637.
- Anderson, K.L., T.A. Tayne and D.M. Ward. 1987. Formation and fate of fermentation products in hot spring cyanobacterial mats. *Appl. Environ. Microbiol.* 53:2343-2352.
- Giovanonni, S., N.P. Revsbech, D.M. Ward and R.W. Castenholz. 1987. Obligately phototrophic *Chloroflexus*: Primary production in anaerobic hot spring microbial mats. *Arch. Microbiol.* 147:80-87.

- Tayne, T.A., J.E. Cutler and D.M. Ward. 1987. Use of *Chloroflexus*-specific antiserum to evaluate filamentous bacteria of a hot spring microbial mat. *Appl. Environ. Microbiol.* 53:1965-1968.
- Ward, D.M., S.C. Brassell and G. Eglinton. 1985. Archaeobacterial lipids in hot-spring microbial mats. *Nature* 318: 656-659.
- Revsbech, N.P. and D.M. Ward. 1984. Microelectrode studies of interstitial water chemistry and photosynthetic activity in a hot spring microbial mat. *Appl. Environ. Microbiol.* 48:270-275.
- Winfrey, M.R. and D.M. Ward. 1983. Substrates for sulfate reduction and methane production in intertidal sediments. *Appl. Environ. Microbiol.* 45:193-199.
- Revsbech, N.P. and D.M. Ward. 1983. Oxygen microelectrode that is insensitive to medium chemical composition: use in an acid microbial mat dominated by *Cyanidium caldarium*. *Appl. Environ. Microbiol.* 45:755-759.
- Winfrey, M.R., E. Beck, P.D. Boehm, and D.M. Ward. 1982. Impact of crude oil on sulfate reduction and methane production in sediments impacted by the Amoco Cadiz oil spill. *Mar. Environ. Res.* 7:175-194.
- Sandbeck, K.A. and D.M. Ward. 1982. Temperature adaptations in the terminal processes of anaerobic decomposition of Yellowstone and Icelandic hot spring microbial mats. *Appl. Environ. Microbiol.* 44: 844-851.
- Sandbeck, K.A. and D.M. Ward. 1981. Fate of immediate methane precursors in low sulfate hot spring algal-bacterial mats. *Appl. Environ. Microbiol.* 41: 775-782.
- Winfrey, M.R., D. Marty, A. Bianchi and D.M. Ward. 1981. Vertical distribution of sulfate reduction, methane production and bacteria in marine sediments. *Geomicrobiology J.* 2: 341-362.
- Ward, D.M. and G.J. Olson. 1980. Terminal processes in the anaerobic degradation of an algal-bacterial mat in a high sulfate hot spring. *Appl. Environ. Microbiol.* 40: 67-74.
- Baresi, L., R.A. Mah and D.M. Ward. 1978. Methanogenesis from acetate: Enrichment studies. *Appl. Environ. Microbiol.* 36: 186-197.
- Ward, D.M., I.R. Kaplan and R.A. Mah. 1978. Methanogenesis from acetate: Studies on a nonmethanogenic bacterium from an anaerobic acetate enrichment. *Appl. Environ. Microbiol.* 35:1185-1192.
- Ward, D.M. and T.D. Brock. 1978. Anaerobic metabolism of hexadecane in sediments. *Geomicrobiology J.* 1:1-9.
- Ward, D.M. and T.D. Brock. 1978. Hydrocarbon biodegradation in hypersaline environments. *Appl. Environ. Microbiol.* 35: 353-359.
- Ward, D.M. 1978. Methanogenesis associated with algal-bacterial mats in the natural thermal gradient (71-30 C) of a hot spring effluent. *Appl. Environ. Microbiol.* 35:1019-1026.
- Ward, D.M. and T.D. Brock. 1976. Environmental factors influencing the rate of hydrocarbon oxidation in temperate lakes. *Appl. Environ. Microbiol.* 31: 764-772.

## Chapters in Edited Books

Ward, D.M. and F.M. Cohan. Microbial diversity in hot spring cyanobacterial mats: pattern and prediction, pp. ??-?? in *Geothermal Biology and Geochemistry in Yellowstone National Park*, B. Inskeep and T. McDermott, eds., Thermal Biology Institute, Montana State University (in press)

Ward, D.M., R. T. Papke, U. Nübel and M.C. McKittrick. 2002. Natural history of microorganisms inhabiting hot spring microbial mat communities: clues to the origin of microbial diversity and implications for micro- and macro-biology, pp. 25-48 in *Biodiversity of Microbial Life: Foundation of Earth's Biosphere* (J.T. Staley and A.-L. Reysenbach, eds.), John Wiley and Sons, NY.

Ferris, M.J., S.C. Nold, C.M. Santegoeds and D. M. Ward. 2001. Examining bacterial population diversity within the Octopus Spring microbial mat community. pp. 51-64 in *Thermophiles: biodiversity, ecology and evolution* (Reysenbach, A.-L., Voytek, M. and Mancinelli, R., eds), Kluwer Academic/Plenum Publishers, NY.

Ward, D.M., M.M. Bateson and J.W. deLeeuw. 2001. Use of 16S rRNA, lipid and naturally preserved components of hot spring mats and microorganisms to help interpret the record of microbial evolution. pp. 167-181 in *Thermophiles: biodiversity, ecology and evolution* (Reysenbach, A.-L., Voytek, M. and Mancinelli, R., eds), Kluwer Academic/Plenum Publishers, NY.

Ward, D.M. and R.W. Castenholz. 2000. Cyanobacteria in geothermal habitats. p. 37-59 in (M. Potts and B. Whitton, eds.) *Ecology of Cyanobacteria*. Kluwer Academic Publishers, The Netherlands.

Ward, D.M., M.J. Ferris, and M.M. Bateson. 1997. Organization of native populations within hot spring microbial mat communities: Need for a more ecological approach, p.147-153. In M.T. Martins, M.I.Z. Sato, J.M. Tiedje, L.C.N. Hagler, J. Dobereiner, and P.S. Sanchez (ed.), *Progress in Microbial Ecology, SBM - Brazilian Society for Microbiology / ICOME - International Committee on Microbial Ecology*, Sao Paulo, Brazil.

Bateson, M.M. and D.M. Ward. 1995. Methods for extracting DNA from microbial mats and cultivated microorganisms--high molecular weight DNA from French Press lysis. section 1.1.4, p. 1-7 in *Molecular Microbial Ecology Manual* (A.D.L. Akkermans, J.D. van Elsas and F.J. de Bruijn, eds.), Kluwer Acad. Publ., Dordrecht, The Netherlands.

Ward, D.M., A.L. Ruff-Roberts and R. Weller. 1995. Methods for extracting RNA or ribosomes from microbial mats and cultivated microorganisms. section, 1.2.3, p. 1-14 in *Molecular Microbial Ecology Manual* (A.D.L. Akkermans, J.D. van Elsas and F.J. de Bruijn, eds.), Kluwer Acad. Publ., Dordrecht, The Netherlands.

Ward, D.M., M.J. Ferris, S.C. Nold, M.M. Bateson, E.D. Kopczyński and A.L. Ruff-Roberts. 1994. Species diversity in hot spring microbial mats as revealed by both molecular and enrichment culture approaches--relationship between biodiversity and community structure, p. 33-44 in *Microbial mats: structure, development and environmental significance* (L. J. Stal and P. Coumète, eds.), Series G: Ecological Sciences, vol. 35, NATO/ASI Series, Springer-Verlag, Heidelberg.

Ward, D.M., J. Bauld, R.W. Castenholz, and B.K. Pierson. 1992. Modern phototrophic microbial mats: anoxygenic, intermittently oxygenic/anoxygenic, thermal, eucaryotic and terrestrial, p. 309-324 in *The Proterozoic Biosphere: a multidisciplinary study* (J.W. Schopf and C. Klein, eds.) Cambridge Univ. Press, Cambridge.

- Jorgensen, B.B., D.C. Nelson, and D.M. Ward. 1992. Chemotrophy and decomposition in modern microbial mats, p.287-293 in *The Proterozoic Biosphere: a multidisciplinary study* (J.W. Schopf and C. Klein, eds.) Cambridge Univ. Press, Cambridge.
- DesMarais, D.J., J. Bauld, A.C. Palmisano, R.E. Summons and D.M. Ward. 1992. The biogeochemistry of carbon in modern microbial mats, p. 299-308 in *The Proterozoic Biosphere: a multidisciplinary study* (J.W. Schopf and C. Klein, eds.) Cambridge Univ. Press, Cambridge.
- Castenholz, R.W., E. D'Amelio, J.D. Farmer, B.B. Jorgensen, A.C. Palmisano, B.K. Pierson, and D.M. Ward. 1992. Modern mat building microbial communities: methods of investigation and supporting data. p. 821-853 in *The Proterozoic Biosphere: a multidisciplinary study* (J.W. Schopf and C. Klein, eds.) Cambridge Univ. Press, Cambridge.
- Ward, D.M., J. Shiea, Y.B. Zeng, G. Dobson, S. Brassell and G. Eglinton. 1989. Lipid biochemical markers and the composition of microbial mats. p.439-454 in *Microbial Mats: Physiological ecology of benthic microbial communities* (Y. Cohen and E. Rosenberg, eds.) Am. Soc. Microbiol., Wash. D.C.
- Ward, D.M., R. Weller, J. Shiea, R.W. Castenholz and Y. Cohen. 1989. Hot spring microbial mats: anoxygenic and oxygenic mats of possible evolutionary significance. p. 3-15 in *Microbial Mats: Physiological ecology of benthic microbial communities* (Y. Cohen and E. Rosenberg, eds.) Am. Soc. Microbiol., Wash. D.C.
- Walch, M., W.A. Hamilton, P.S. Handley, N.-C. Holm, J.G. Kuenen, N.P. Revsbech, M.A. Rubio, D.A. Stahl, O. Wanner, D.M. Ward, P.A. Wilderer and J.W.T. Winpenny. 1989. Spatial distribution of biotic and abiotic components in the biofilm. p. 165-191 in *Structure and Function of Biofilms* (W.G. Characklis and P.A. Wilderer, eds) Dahlem Konferenzen, John Wiley & Sons Ltd., Chichester.
- Ward, D.M. 1989. Molecular probes for analysis of microbial communities. p. 145-163 in *Structure and Function of Biofilms* (W.G. Characklis and P.A. Wilderer, eds) Dahlem Konferenzen, John Wiley & Sons Ltd., Chichester.
- Revsbech, N.P. and D. M. Ward. 1984. Microprofiles of dissolved substances and photosynthesis in microbial mats measured with microelectrodes, p. 174-188 in *Microbial Mats: Stromatolites*, Y. Cohen, R.W. Castenholz and H.O. Halvorson (eds.), A.R. Liss, Inc., N.Y.
- Ward, D.M. 1984. Summary of discussion on decomposition of microbial mats, p. 277-280 in *Microbial Mats: Stromatolites* Y. Cohen, R.W. Castenholz and H.O. Halvorson (eds.), A.R. Liss, Inc., N.Y.
- Ward, D.M., E. Beck, N.P. Revsbech, K.A. Sandbeck and M.R. Winfrey. 1984. Decomposition of hot spring microbial mats, p. 191-214 in *Microbial mats: Stromatolites* Y. Cohen, R.W. Castenholz and H.O. Halvorson (eds.), A.R. Liss, Inc., N.Y.
- Ward, D.M., M.R. Winfrey, E. Beck and P. Boehm. 1982. AMOCO CADIZ pollutants in anaerobic sediments: fate and effects on anaerobic processes. p. 159-190 in *Ecological Study of the Amoco Cadiz Oil Spill, Report of the NOAA-CNEXO Joint Scientific Commission*, U.S. Dept. Commerce, Washington, D.C.
- Ward, D.M. 1981. Microbial responses to Amoco Cadiz oil pollutants--Note de synthese, p. 217-222 in *Amoco Cadiz: Fates and effects of the oil spill*. Proc. Int. Symp. Centre National pour L'Exploitation des Oceans, Paris.

Winfrey, M.R. and D.M. Ward. 1981. Effect of the Amoco Cadiz oil spill on predominant anaerobic microbial processes in intertidal sediments. p. 257-267 in Amoco Cadiz: Fates and effects of the oil spill. Proc. Int. Symp. Centre National pour L'Exploitation des Oceans, Paris.

### **Reviews**

Petchey, O.L., D.M. Ward (and others TBD) Units and measures of microbial and macrobial diversity (in prep)

Papke, R.T. and D.M. Ward. 2004. The importance of physical isolation in microbial evolution FEMS Microbiol. Ecology 48:293-303.

Ward, D.M. 1998. A natural species concept for prokaryotes Curr. Opinion in Microbiology 1:271-277.

Ward, D.M., Bateson, M.M., Ferris, M.J. and S.C. Nold. 1998. A natural view of microbial biodiversity within hot spring cyanobacterial mat communities. Microbiol. Mol. Biol. Rev. 62:1353-1370.

Ward, D.M., Bateson, M.M., R. Weller and A.L. Ruff-Roberts. 1992. Ribosomal analysis of microorganisms as they occur in nature. Adv. Microbial Ecology 12:219-286.

Ward, D.M., T.A. Tayne, K.L. Anderson and M.M. Bateson. 1987. Community structure, and interactions among community members in hot spring cyanobacterial mats. Symp. Soc. Gen. Microbiol. 41:179-210.

Ward, D.M. and M.R. Winfrey. 1985. Interactions between methanogenic and sulfate-reducing bacteria in sediments. Adv. Aquatic Microbiol. 3:141-179.

Gundlach, E.R., P.D. Boehm, M. Marchand, R.M. Atlas, D.M. Ward and D.A. Wolfe. 1983. The fate of Amoco Cadiz oil. Science 221:122-129.

Ward, D.M., R.M. Atlas, P.D. Boehm and J.A. Calder. 1980. Microbial biodegradation and the chemical evolution of Amoco Cadiz oil pollutants. AMBIO 9: 219-225.

Mah, R.A., D.M. Ward, L. Baresi and T.L. Glass. 1977. Biogenesis of methane. Ann. Rev. Microbiol. 31: 309-341. (ISI Citation Classic)

### **Books**

Brock, T.D., K.M. Brock, and D.M. Ward. 1986. Basic Microbiology with Applications, 3rd Ed. Prentice-Hall, Englewood, Cliffs, N.J., 557 pp.

### **Other**

Ward, D.M. 1998. Microbiology in Yellowstone National Park. ASM News 64:141-146.

Ward, D.M., R. Weller and M. Bateson. 1987. Using 16S rRNA to study the composition of simple hot spring microbial communities. Biofilm Bull. 1 (2).

Ward, D.M. and T.D. Brock. 1976. Nutrient limitation of oil biodegradation in lakes of varying water quality in Vilas County, Trans. Wis. Acad. Sci., Arts Lett. 64: 240-249.