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EDUCATION

Ph.D.	University of California, Santa Barbara	Ecology, Evolution and Marine Biology, 1998
M.S.	San Francisco State University	Molecular and Cellular Biology, 1995
B.S.	California Polytechnic State University	Biochemistry, 1989

PROFESSIONAL APPOINTMENTS

2018	Instructor (LOA), UNR, Department of Molecular Microbiology and Immunology
2017 –	Adjunct Professor, UNR, Department of Molecular Microbiology and Immunology
2016 –	Subcontractor (badged 2018), Jet Propulsion Laboratory, La Cañada-Flintridge
2015 –	Affiliate Faculty, UNR, Graduate Program of Hydrologic Sciences
2013 –	Research Professor, Desert Research Institute, Reno
2011	Visiting Professor, University Pierre et Marie Curie (Paris VI)
2010 – 2012	Senior Visiting Fellow, School of Biotechnology and Biomolecular Sciences, University of New South Wales, Sydney, Australia
2006 – 2013	Associate Research Professor, Desert Research Institute, Reno
2008 –	Adjunct Professor, UNR, Department of Biochemistry and Molecular Biology
2005 –	Adjunct Professor, UNR, Biology Department
2003 –	Adjunct Professor, UNR, Reno Environmental Sciences Graduate Program
2002 –	Adjunct Professor, UNR, Reno Cell and Molecular Biology Graduate Program
2001 – 2006	Assistant Research Professor, Desert Research Institute, Reno
1999 – 2001	Postdoctoral Research Associate, Center for Microbial Ecology, Michigan State University
1995 – 1998	Graduate Student Researcher, University of California, Santa Barbara
1992 – 1994	Graduate Student Research Assistant, San Francisco State University, San Francisco
1991 – 1993	Lab Assistant II - Biogeochemical Reactions in Estuaries Land Margin Ecosystems Research Project, Tomales Bay, California
1989 - 1991	Research Assistant - Bermuda Biological Station for Research Inc., Bermuda

PEER-REVIEWED PUBLICATIONS (74)

- Hedlund, BP, M Chuvochina, P Hugenholtz, KT Konstantinidis, AE Murray, M Palmer, DH Parks, AJ Probst, A-L Reysenbach, LM Rodriguez-R, R Rossello-Mora, IC Sutcliffe, SN Venter, WB Whitman. 2022. SeqCode, a nomenclatural code for prokaryotes described from sequence data. *Nature Microbiology*, doi:10.1038/s41564-022-01214-9.
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- Avalon, NE, AE Murray, BJ Baker. 2022. Integrated metabolomic-genomic workflows accelerate microbial natural product discovery. *J. Anal. Chem.* doi:10.1021/acs.analchem.2c02245.
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- Hand, KP, CB Phillips, AE Murray, GB Garvin, EH Maize et al. 2022. Science goals and mission architecture of the Europa Lander Mission Concept. *Planetary Science Journal.* 3:22. doi:10.3847/PSJ/ac4993.

- Avalon, NE, AE Murray, HE Daligault, C-C Lo, KW Davenport, AEK Dichosa, PSG Chain, BJ Baker. 2021. Bioinformatic and mechanistic analysis of the palmerolide PKS-NRPS biosynthetic pathway from the microbiome of an Antarctic ascidian. *Front. Chem.* 9:802574. doi:10.3389/fchem.2021.802574
- Murray, AE, C-C Lo, HE Daligault, NE Avalon, RW Read, KW Davenport, ML Higham, Y Kunde, AEK Dichosa, BJ Baker, and PSG Chain. 2021. Discovery of an Antarctic ascidian-associated uncultivated Verrucomicrobia with antimelanoma palmerolide biosynthetic potential. *mSphere* 6:e00759-21. doi:10.1128/msphere.00759-21.
- Venturelli, L. Z Harrold, AE Murray, E Lundin, G Dietler, S Kasas, R Foschia. 2021. Nanomechanical bio-sensing for fast and reliable detection of viability and susceptibility of microorganisms. *Sensors and Actuators B: Chemical.* 348: 130650; doi:10.1016/j.snb.2021.130650.
- Chaffron, S, E Delage, M Budinich, D Vintache, N Henry, C Nef, M Ardyna, AA Zayed, PC Junger, PE Galand, C Lovejoy, AE Murray, H Sarmiento, *Tara* Oceans coordinators, S Acinas, M Babin, D Iudicone, O Jaillon, E Karsenti, P Wincker, L Karp-Boss, MB Sullivan, C Bowler, C de Vargas, D Evelillard. 2021. Environmental vulnerability of the global ocean plankton community interactome. *Science Advances.* 35(7): eabg1921. doi: 10.1126/sciadv.abg1921.
- Chou, L, AE Murray, F Kenig. 2021. Organic sulfones in the brine of Lake Vida (East Antarctica). *Geochimica et Cosmochimica Acta.* 292:409-426. doi.org/10.1016/j.gca.2020.10.001.
- Ingels, J, RB Aronson, CR Smith, A Baco, HM Bik, JA Blake, A Brandt, M Cape, D Demaster, E Dolan, E Domack, S Fire, H Geisz, M Gigliotti, H Griffiths, KM Halanych, C Havermans, F Huettmann, S Ichman, S Karanz, A Leventer, AR Mahon, J McClintock, ML McCormick, BG Mitchell, AE Murray, L Peck, A Rogers, B Shoplock, KE Smith, B Steffel, MR Stukel, A Sweetman, M Taylor, AR Thurber, M Truffer, A Van de Putte, A Vanreusel, MA Zamora-Duran. 2020. Antarctic ecosystem responses following ice-shelf collapse and iceberg calving: Science review and future research. *Wires Climate Change*, e682. DOI:10.1002/wcc.682.
- Murray, AE, NE Avalon, LG Bishop, PSG Chain, KW Davenport, E Delage, AKE Dichosa, D Eveillard, ML Higham, S Kokkaliari, CC Lo, CS Riesenfeld, R Young, BJ Baker. 2020. Uncovering the microbiome and distribution of palmerolide in *Synoicum adareanum* across the Anvers Island archipelago, Antarctica. *Mar. Drugs*, 18:298. doi:10.3390/md18060298
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- Danis, B, AP Van de Putte, P Convey, HJ Griffiths, K Linse, AE Murray. 2020. Editorial: Antarctic Biology: Scale Matters. *Front. Ecol. Evol.* doi:10.3389/fevo.2020.00091.
- Avalon, NE, AE Murray, S Kokkaliari, CC Lo, AEK Dichosa, K Davenport, PSG Chain, BJ Baker. 2020. Establishment of the core microbiome of the ascidian *Synoicum adareanum* near Palmer Station, Antarctica. *Mar. Drugs.* 18(40):17-18.
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- Chou, L, F Kenig, AE Murray, CH Fritsen, PT Doran. 2018. Environmental metabolomics and the effect of legacy from previous environmental conditions: The brine of Lake Vida, East Antarctica. *Organic Geochem*. 122:161-170. 10.1016/j.orggeochem.2018.05.002.
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- Proemse, BC, AE Murray, C Schallenberg, B McKiernan, B Glazer, SE Young, NE Ostrom, A Bowie, ME Wieser, F Kenig, PT Doran, R Edwards. 2017. Iron cycling in the anoxic cryo-ecosystem of Antarctic Lake Vida. *Biogeochemistry*, 134(1): 17-27. doi:10.1007/s10533-017-0346-5.
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- Ghiglione, JF, PE Galand, T Pommier, C Pedrós-Alio, EW Maas, K Bakker, S Bertilson, DL Kirchman, C Lovejoy, PL Yager, AE Murray. 2012. Pole to pole biogeography of surface and deep marine bacterial communities. *Proc Natl Acad Sci*, 109 (43) 17633-17638. doi:10.1073/pnas.120816109.
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- Williams, TJ, E Long, F Evans, MZ DeMaere, FM Lauro, MJ Raftery, H Ducklow, JJ Grzymiski, AE Murray, R Cavicchioli. 2012. A metaproteomic assessment of summer and winter bacterioplankton from Antarctic Peninsula coastal surface waters. *ISME Journal* 6:1883-1900; doi:10.1038/ismej.2012.28.
- Grzymiski, JJ, CS Riesenfeld, TJ Williams, AM Dussaq, H Ducklow, M Erickson, R Cavicchioli, & AE Murray. 2012. A metagenomic assessment of winter and summer bacterioplankton from Antarctic Peninsula coastal surface waters. *ISME Journal* 6:1901-1905; doi: 10.1038/ismej.2012.31.
- Ghiglione, JF, and AE Murray. 2012. Pronounced summer to winter differences and higher wintertime richness in coastal Antarctic marine bacterioplankton. *Environ Microbiol*, 14(3): 617-629; DOI: 10.1111/j.1462-2920.2011.02601.
- Ducklow, HW, KMS Myers, M Erickson, JF Ghiglione, AE Murray. 2011 Response of a summertime Antarctic marine bacterial community to glucose and ammonium enrichment. *Aquat Microb Ecol* 64:205-220
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- Murray, AE, V Peng, C Tyler, P Wagh. 2011. Marine bacterioplankton biomass, activity and community structure in the vicinity of Antarctic icebergs. *Deep Sea Research*, II. 58: 1407-1421.
- Smith, Jr, KL, AD Sherman, T Shaw, AE Murray, M Vernet, A Cefarelli. 2011. Carbon export associated with free-drifting icebergs in the Southern Ocean. *Deep Sea Research*, II. 58:1485-1496.
- Straza, TRA, HW Ducklow, AE Murray, and DL Kirchman, 2010. Abundance and single-cell activity of bacterial groups in Antarctic coastal waters. *Limnol Oceanogr*, 55: 2010, 2526-2536.
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Ph.D. DISSERTATION

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M.S. THESIS

- Murray, AE. 1994. Community Fingerprint Analysis: A molecular method for studying marine bacterioplankton diversity. Masters Thesis. San Francisco State University, San Francisco, CA.

BOOK CHAPTERS and E-BOOKS

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- K Hand, AE Murray, JB Garvin, WB Brinckerhoff, B Christner, KE Edgett, et al. 2021. Science of the Europa Lander Mission Concept. *Bulletin of the American Astronomical Society* 53 (4), 352

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- K Hand, CB Phillips, CF Chyba, B Toner, K Katija, V Orphan, J Huber, et al. 2021. On the Past, Present, and Future Role of Biology in NASA's Exploration of our Solar System. *Bulletin of the American Astronomical Society* 53 (4), 229
- W Stone, S Howell, N Bramall, C German, AE Murray, V Siegel. 2021. National Ocean Worlds Analog Test Facility and Field Station. *Bulletin of the American Astronomical Society* 53 (4), 416
- P Mahaffy, M Weng, R Arevalo, M Benna, R Summons, W Brinckerhoff, et al. 2021. Agnostic Biosignature Exploration at Europa through Plume Sampling. *Bulletin of the American Astronomical Society* 53 (4), 059
- Hand, KP, AE Murray, JB Garvin, WB Brinckerhoff, BC Christner, KS Edgett, BL Ehlmann, CR German, AG Hayes, TM Hoehler, SM Horst, JI Lunine, KH Nealson, C Paranicas, BE Schmidt, DE Smith, AR Rhoden, MJ Russell, AS Templeton, PA Willis, RA Yingst, CB Phillips, ML Cable, KL Craft, AE Hofmann, TA Northeim, RP Pappalardo, and the Project Engineering Team (2017): Report of the Europa Lander Science Definition Team. February 2017. https://solarsystem.nasa.gov/docs/Europa_Lander_SDT_Report_2016.pdf

IN REVIEW

- Barret, M, L Gandois, F Thalasso, K Martinez Cruz, A Sepulveda Jauregui, C Lavergne, R Teisserenc, P Aguilar, O Gerardo-Nieto, C Etchebehere, B Martins Dellagnezze, J Fochesatto, N Tananaev, MM Svenning, CVW Seppey, AT Tveit, R Chamy, MS Astorga-España, A Mansilla, A Van de Putte, M Sweetlove, AE Murray, L Cabrol: Combined microbial and biogeochemical characterisation of terrestrial and aquatic ecosystems in three high-latitude regions (North Siberia, Alaska and Chilean Patagonia) in the perspective of methane cycle. *Scientific Data*. In review.
- Seppey, CVW, L Cabrol, F Thalasso, L Gandois, C Lavergne, K Martinez-Cru, A Sepulveda-Jauregui, P Aguilar-Muñoz, MS Astorga-España, R Chamy, B Martins Dellagnezze, C Etchebehere, J Fochesatto, O Gerardo-Nieto, A Mansilla, AE Murray, M Sweetlove, N Tananaev, R Teisserenc, AT Tveit, A Van de Putte, MM Svenning¹, Maialen Barret⁶ Biogeography of microbial communities in high-latitude ecosystems: contrasting drivers for methanogens, methanotrophs and global prokaryotes. Submitted to *Environmental Microbiology*

FELLOWSHIPS, AWARDS, DISTINGUISHED HONORS

- 2021 NASEM Committee on Astrobiology and Planetary Sciences, short-term appointment (Oct21-Sept22)
- 2021 Advisor of the Year, Desert Research Institute
- 2019 DRI Science Medal
- 2018 Advisor of the Year, Desert Research Institute
- 2016 Co-chair, NASA Europa Lander Science Definition Team
- 2016 Sabbatical, DRI
- 2014 Nevada System of Higher Education Regents Researcher Award
- 2009 Nevada System of Higher Education Regents Rising Researcher Award
- 2009 Sabbatical, DRI
- 2006 Peter B. Wagner Medal of Excellence for DRI Scholars in the Early to Mid Stages of Career Development
- 2005 Distinguished Alumni Award, Romberg Tiburon Center for Environmental Studies, SFSU
- 2004 - US Representative to the Scientific Standing Group in Life Sciences, on the Scientific Committee on Antarctic Research (SCAR); Polar Research Board appointment: 2004-2015.
- 2004 Member of the Census of Antarctic Marine Life Steering Committee
- 2000 Postdoctoral Travel Award, 8th Conference on Small Genomes
- 1999 Postdoctoral Travel Award, 7th Conference on Small Genomes
- 1999 ASM Postdoctoral Travel Award, Microbial Biodiversity Meeting
- 1998 Graduate Dissertation Fellowship, Graduate Division UCSB
- 1997 Ellen Schamberg Burley Award, Dept. of Ecology, Evolution and Marine Biology, UCSB
- 1996 American Society of Microbiology Student Travel Award, ASM General Meeting

- 1993 Marine Biological Laboratory, Workshop on Molecular Evolution tuition award
 1992 Romberg Tiburon Center for Environmental Studies Graduate Student Research Award

GRANTS (Career total ~ \$19 M)

External Research Support (Current awards):

- 2022 Biogeochemical machines behind the scene - Lake Tahoe picoplankton 2002-vs. 2022: What can we learn from Tahoe's microbiosphere? (PI). DRI Innovation Research Program. Total award amount: \$39,981. Total award period: 9/1/22 - 8/30/22.
- 2022 *ANT LIA Planning an Antarctic omics initiative (AOI) to advance understanding of the evolution and adaptive potential of Antarctic organisms.* (PI) NSF Office of Polar Programs. Total award amount \$143,549. Total award period: 8/15/22 - 8/14-24.
- 2019 *Environmental Life Sciences Research Community Activities in Support of the Research Coordination Network for Ocean Worlds (NOW).* (PI). NASA. Total award amount \$150,000. Total award period: 5/1/19 – 4/30/23.
- 2018 *Atmospheric Chemistry of Bioaerosols.* (CoPI) NSF-DAS. Total award amount \$495,039. Total award period: estimated start 06/01/18 – 05/31/23.

Past awards

- 2020 *Informing models of life in Ocean World brines: lessons from active microbial life in briny waters of Lake Vida at -13 °C.* Nevada NASA Space Grant Total award amount: \$67,356. Total award period: 8/1/20-8/31/22.
- 2021 *Living Snow in the Sierra Nevada.* (CoI) Nevada NASA Space Grant. Total award amount: \$34,515. Total award period: 8/1/21-7/30/22
- 2017 *Advancing Nanomotion Sensor Technology to Provide Evidence for Active Life in Ocean Worlds.* (PI) NASA-COLDTech. Total award amount \$ 691,838. Total award period: 03/15/17-03/15/21.
- 2019 *Workshops: Development of a roadmap for the next decade of microbial systematics research. Subcontract: UNLV (NSF funding).* Total award amount \$22,123. Total award period: 11/01/19-7/31/20.
- 2019 *Ocean Worlds.* (Collaborator) JPL Research and Technology Development. Total award amount \$15,000. Total award period: 4/1/19 – 3/30/20.
- 2018 *Deciphering the metagenome-encoded pathway and domain structure for Palmerolide biosynthesis.* (PI) NIH/NCI R21. Total award amount \$ 430,523. Total award period: 03/01/18 – 02/28/20.
- 2016 *Microbes in ice: new approaches to detecting microbial cells and RNA signatures of cellular metabolism in glacial ice cores.* (PI). DRI IPA Total award amount \$41,105. Total award period: 2/16 – 1/18.
- 2016 *Europa Lander Science Definition Team (Sub-award), JPL.* Total award amount: \$180,990. Total award period 6/15/16-12/08/17.
- 2015 *Methanogenic biodiversity and activity in Arctic and Sub-Antarctic ecosystems affected by climate change.* (Sub-award) ERANET-LAC. Total award amount \$598,734. Total award period 9/1/15 – 8/31/18.
- 2015 *Microscopic investigations of bacteria and sediments of the Lake Vida ice core.* (CoI) Nevada NASA Space Grant Consortium. Total award amount \$55,272. Total award period: 8/1/14 – 5/6/16.
- 2014 *Building capacity in Interdisciplinary Snow Sciences for a Changing World.* (PI 10/1/16-) NASA-EPSCoR. Total award amount \$1,089,439. Total award period: 9/1/14 – 9/31/18.
- 2012 *Assessing winter bacterioplankton distributions and carbon cycling as part of AMLR field program, August 2012.* (PI) NSF-OPP-1250091. Total award amount \$192,000. Total award period: 8/1/12 – 12/31/15.
- 2013 *Project Narvak: Arctic Lakes & Seasonal Cycles of Habitability.* (Subaward) NASA-JPL subaward. Total award amount \$26,000. Total award period: 9/30/13 – 9/29/15.
- 2012 *Characterization of atmospheric biological aerosols. Effective Designs to Generate Enhanced Support program,* (DRI. CoPI). Total award amount: \$ 35,971. Total award period: 9/10/12 – 9/9/14. \$ 35,971.

- 2011 *Metagenomics and metatranscriptomics analyses of the Lake Vida brine microbial community reveals lifestyles at the low temperature limits of life.* (PI) JGI-CSP. Total award allocation: 1 terrabase DNA sequencing; Total award period: 09/01/11-present.
- 2011 *Identification of the Palmerolide A biosynthetic gene cluster: a path to NIH support.* (PI) DRI Institute Project Assignment; Total award amount: \$19,980; Total award period: 6/1/11 – 4/30/15.
- 2009 *Astrobiology of Icy Worlds: Habitability, Survivability and Detectability.* (Co-I) NASA-NAI. Total Award Amount: \$8,184,000 total; Total award period: 1/01/09 – 10/31/14.
- 2009 *Collaborative Research: Geochemistry and Microbiology of the Extreme Aquatic Environment in Lake Vida, East Antarctica.* (CoLead PI, DRI Lead). NSF-OPP 0739681. Total award amount: \$664,505. Total award period: 8/15/09 – 7/31/13.
- 2007 *IPY: Bacterioplankton Genomic Adaptations to Antarctic Winter.* (PI) NSF-OPP 0632389. Total award amount: \$466,622; Total award period: 6/1/07 – 5/31/10.
- 2007 *Free-Drifting Icebergs as Proliferating Dispersion Sites of Iron Enrichment, Organic Carbon Production and Export in the Southern Ocean.* (Co-PI) NSF-OPP 0636543. Total Award Amount: \$257,864; Total award period: 9/1/07 – 8/31/10.
- 2007 *Cultivation of tunicate associated microorganisms capable of anticancer compound production.* (PI) DRI VPR and DEES; Total Award Amount: \$4,800; Total award period: 06/01/07 – 07/01/08
- 2006 *Gene expression in extreme environments.* (PI) DRI VPR and DEES. Total award amount: \$57.65K. Total award period: 03/15/06 – 03/14/07.
- 2005 *Research Infrastructure for Nevada's Growth – Targeting Research with Uniqueness and Excellence (RING-TRUE III) Cognitive Information Processing.* (Task Coordinator) NSF 0447416. NSF EPSCoR; Total Award Amount: \$120,000 to DRI of \$9,000,000 total; Total award period: 07/05 – 07/08.
- 2005 *Environmental genomics of Antarctic marine bacterioplankton using a large contig sequencing approach.* JGI-CSP; 300 large contig clones from Antarctic seawater will be sequenced and ~17K fosmid end-sequences; Total award period: 5/30/05 – 10/30/10.
- 2004 *Microbial Genome Sequencing of Polaribacter irgensii, and Marine Actinobacterium PHSC20C1 isolated from Antarctic seawater.* Gordon and Betty Moore Foundation: Two genomes and three environmental fosmids were sequenced to 8X coverage. 8/1/04 – 7/31/06.
- 2004 *Instrument Acquisitions for the Enhancement of DRI's Microbial Ecology Research and Education Programs* (Co-PI) NSF-OPP-0421514; NSF-MRI; Total award amount: \$648,685; Total award period: 08/01/04 – 07/31/07.
- 2003 *Subsurface ice and brine sampling: life detection and characterization in the McMurdo Dry Valleys using an ultrasonic gopher.* (Co-PI) NASA, ASTEP Program; Total award amount: \$1,400,000 total; Total award period: 1/01/03 – 7/31/08.
- 2002 *Geobiology and the emergence of terraced architecture during carbonate mineralization.* (Co-PI) NSF 0221743; NSF Biocomplexity, Coupled Biogeochemical Cycles; Total award amount: \$1,113,951; Total award period: 09/01/02 – 08/31/08.
- 2002 *Research Infrastructure for Nevada's Growth – Targeting Research with Uniqueness and Excellence (RING-TRUE II); Abiotic Approaches To Abiotic Stress.* (Internal Steering Committee Member). NSF 0447416. NSF EPSCoR; Total Award Amount: \$78,886 to DRI of \$9M total; Total award period: 08/01/02 – 07/31/05.
- 2002 *A meta-genome level analysis of an extreme microbial symbiosis.* (Co-PI) NSF 0507560; NSF Biocomplexity: Genome Enabled; Total award amount: \$1,499,907; Total award period: 01/10/02 – 12/31/06
- 2002 *Microbial diversity and ecology in Lake Tahoe; an exploratory mission into a high latitude, ultra-oligotrophic lake.* (PI). DRI Center for Watersheds and Environmental Sustainability, DEES, and VPR; Total award amount: \$30,000; Total award period: 06/01/02 – 05/31/04.
- 2001 *Gene expression in extreme environments: extending microarray technology to understand life at its limits.* (PI) NSF-OPP-0085435; NSF Life in extreme environments program; Total award amount: \$309,004; Total award period: 03/01/01 – 02/28/05.

INVITED TALKS (90 in 19 countries)

- 2021 Murray, AE. Charting the course to ocean worlds. Brines Across the Solar System – Modern Brines Conference, Lunar and Planetary Science Institute, Houston, TX. (Virtual), October.
- 2021 Murray, AE. Signs of life from the cryosphere. Extremophiles 2021 Webinar. Athens, Greece. (Virtual), September.
- 2021 Murray, AE. Establishing a new system for naming uncultivated microorganisms – a global microbiology need examined through the window of an Antarctic microbial symbiosis. University of Nevada Microbiology and Immunology Seminar (Virtual). Reno, March.
- 2021 Murray, AE. Roadmap to naming uncultivated Archaea and Bacteria. Path forward for Naming the Uncultivated Workshop Series. (Virtual), February.
- 2020 Murray, AE, C German, A Rhoden, K Arrigo. Network for Ocean Worlds. National Academy of Sciences, Decadal Survey, Planetary Science and Astrobiology Decadal Survey 2023-2032 Panel on Ocean Worlds and Dwarf Planets, October (Virtual).
- 2020 Murray, AE. Life as an Ocean Worlds research scientist, (Panelist) Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS), Santa Cruz, CA, (Virtual), October.
- 2020 Murray, AE, BJ Baker, N Avalon. Palmer microbiomes – from the plankton to a sea squirt. Palmer Station Antarctica, Science Lecture, (Virtual) September.
- 2019 Murray, AE, F Rack, M Daly, R Kaufman, B Zook. Ice shelves and sub-ice shelf oceanography. Europa Station Workshop, Austin Texas, November.
- 2019 Murray, AE. Polar windows to Ocean Worlds of the outer solar system. Ocean Worlds 4. Columbia Maryland, May. (Keynote)
- 2019 Murray, AE. Life in Antarctica's icy and ocean ecosystems: windows to Ocean Worlds of the outer solar system. Polar and Alpine Microbiology Meeting, Hamilton, New Zealand, February.
- 2019 Murray, AE. Patterns in microbial diversity at, and between the polar oceans. Polar and Alpine Microbiology Meeting, Hamilton, New Zealand, February. (Keynote)
- 2018 Murray, AE. Life in Antarctica's icy and ocean ecosystems: windows to ocean worlds of the outer solar system. Mediterranean Institute of Oceanography, Marseille, France, October.
- 2018 Murray, AE. 'Omics reveals insights into biodiversity, microbial metabolism and evolution at the poles. Center for Genomic Sciences, UNAM, Cuernavaca, Mexico, September.
- 2018 Murray, AE. Cryosphere connections: linking microbial life in earth's extremely cold ecosystems to the search for biosignatures on a landed mission to Europa. XI Meeting of Astrobiology, Cuernavaca, Mexico, September. (Keynote)
- 2018 Murray, AE, K Caldiera. Light and life – a guiding theme in the future ocean science and exploration initiative. OceanX Ideation Workshop, Westport, Connecticut, April.
- 2017 Murray, AE, J Garvin, KP Hand. Europa Lander science definition team update. Outer Planets Advisory Group, Atlanta, Georgia, February.
- 2016 Murray, AE. Southern ocean bacterioplankton – trends across time, space and ecosystem function. Institute of Ecology and Evolution, University of Oregon, Eugene, Oregon, November.
- 2016 Murray, AE, J Garvin, KP Hand. Europa Lander science definition team update. Space Studies Board Committee on Astrobiology and Planetary Sciences, Irvine California, September.
- 2016 Murray, AE, J Garvin, KP Hand. Europa Lander science definition team update. Biosignatures of Extant Life on Ocean Worlds, Goddard Space Flight Center, Greenbelt, Maryland, September.
- 2016 Murray, AE., PT Doran, A Bowie, M Duhaime, R Edwards, BT Glazer, F Kenig, B McKiernan, N Ostrom, B Proemse, C Schallenberg, S Young. Life detection in Antarctic Lake Vida brine. ISME 16 Montreal Canada, August.
- 2016 Murray, AE, PT Doran. Insights from Antarctic Lake Vida regarding habitability of icy brines. Europa Project Meeting, Ann Arbor, Michigan, July.
- 2016 Murray, AE. Southern Ocean bacterioplankton diversity and function: emerging trends across environmental gradients. Southern Connections. Punta Arenas, Chile. January.

- 2015 Murray, AE. 'Omics reveals insights into cryptic microbial pathways: examples from extreme environments and host-microbial associations. University of Nevada, Reno, October
- 2015 Murray, AE. Antarctic microorganisms: a window into the extreme. ASM General Meeting, New Orleans, Louisiana, May.
- 2015 Murray, AE, BJ Baker. Metagenomics: a window into the microbial world – a playground for drug discovery. USF Global Health Infectious Disease Research and The Center for Drug Discovery and Innovation, Annual Symposium “Frontiers of Drug Discovery”. Tampa, Florida, February.
- 2014 Murray, AE, DT Andersen, CP McKay. Antarctic analogs for Enceladus. AGU Fall Meeting, San Francisco, California, December.
- 2014 Murray, AE. Islands of microbial diversification: unusual Antarctic lake ecosystems. Molecular and Genetic Advances to Understanding Evolution and Biodiversity in the Polar Regions. National Research Council Institute of Biosciences and Bioresources, Naples, Italy, October.
- 2014 Murray, AE. Insights on the habitability in the icy brines of Lake Vida. Chinese Academy of Sciences Tibetan Plateau Research Institute, Beijing, China, June.
- 2014 Murray, AE. Icy brines and icy moons. International Geobiology Meeting, Wuhan, China. June.
- 2014 Murray, AE. Life in the slow, dark, salty, and oxygen-depleted lane – insights from habitability from Lake Vida. Habitable Worlds Across Space and Time. Space Science Telescope Institute, Spring Symposium. Baltimore, Maryland. April.
- 2013 Murray, AE. Next generation-informed views of diversity and ecosystem function of polar marine microbes. Microbiology, Immunology, and Pathology Department. Colorado State University, Fort Collins, Colorado. November.
- 2013 Murray, AE, N Ostrom, M Gollery, A Pati, K Billis, T Glavina del Rio, N Varghese C Fritsen, F Kenig, S Young, P Doran. On the cold side of life: explorations into the dark salty and icy interior of Lake Vida. American Society of Microbiology General Meeting, Denver, Colorado, May.
- 2013 Murray, AE, N Ostrom, R Edwards, C Fritsen, F Kenig, P Doran. Microbiology of Antarctica’s Lake Vida. National Academy Committee on Astrobiology and Planetary Sciences, Space Studies Board. Washington DC, March.
- 2012 Murray, AE. JJ Grzymiski, H Ducklow, T Williams, R Cavicchioli, V Peng. Different Approaches – Same Story? Studies of Antarctic Peninsula bacterioplankton through a rapid evolution in DNA sequencing technology. Next Generation Sequencing at the Poles Workshop, Université de Liège, Liège, Belgium, November.
- 2012 Murray, AE, JF Ghiglione, P Galand, C Pedrós-Alió, D Kirchman, P Yager, S Bertilson, C Lovejoy. Biogeography, diversity, and function of polar bacterioplankton. Department of Biology, University of Missouri, Columbia, Missouri, September.
- 2012 Murray, AE. Masses of microbial diversity information and state of the art access to it. MARS Workshop, Brussels, Belgium, May.
- 2012 Murray, AE. Southern Ocean bacterioplankton: modulators and indicators of ecosystem function. Ross Sea Workshop, NOAA-NMFS, San Diego, California, March.
- 2011 Murray, AE. JJ Grzymiski, H Ducklow, C Riesenfeld, T Williams, R Cavicchioli. Metagenome and metaproteome analysis reveal distinct differences in carbon cycling pathways of marine bacterioplankton in coastal Antarctic waters between polar summer and winter. Molecular Biosciences Program, University of Nevada, Reno, Nevada, November.
- 2011 Murray, AE. Exploring the Lake Vida brine microbial community – a window into diversity, adaptation and processes in extreme cold. DOE Joint Genome Institute, California, November.
- 2011 Murray, AE, E Kuhn, A Ichimura. Cryobrines of Lake Vida – detecting life on the edge. Applied and Environmental Microbiology Gordon Research Conference, Mt. Holyoke, Massachusetts, July.
- 2011 Murray, AE, JJ Grzymiski, H Ducklow, T Williams, R Cavicchioli. Metagenomics in *light* of ecosystem ecology. University of Western Cape, Capetown, South Africa, June.

- 2010 Murray, AE. Microbial madness – investigations into life that thrives in extreme environments. K-16 Education & Engineering Programs (KEEP) Seminar Series. University of Nevada, Reno, Nevada, September.
- 2010 Murray, AE. Microbe planet: life on earth, extreme environments, and astrobiology. Tahoe Center for Environmental Sciences/Squaw Valley Institute, Incline, Nevada, September.
- 2010 Murray, AE, JJ Grzymiski, H Ducklow, T Williams, R Caviccioli. Metagenomics in *light* of ecosystem ecology. Université Claude Bernard Lyon 1, Department of Microbial Ecology, Lyon, France, May.
- 2009 Murray, AE. K. Cawley, DM McNight, C Fritsen, F Kenig, P Doran. Life in the ice cover and underlying cold brine of Lake Vida, Antarctica. Goldschmidt Meeting, Davos, Switzerland, June.
- 2009 Murray, AE. JF Ghiglione. Bacterioplankton community composition over the annual cycle at Kerguelen and Anvers Islands. CAML Final Symposium, Genoa, Italy, May
- 2008 Murray, AE, JJ Grzymiski, H Ducklow, T Williams, R Caviccioli. Metagenomics in *light* of ecosystem ecology. EC-US workshop on Marine Genomics: The Interface of Marine Microbial Ecology and Biotechnological Applications, Monaco, October
- 2008 Murray, AE, JJ Grzymiski, H Ducklow. Seasonal dynamics in Antarctic marine bacterioplankton community composition reveals adaptations to polar winter. Universidad Magallanes, US Embassy American Corners Program, Chile, September.
- 2008 Murray, AE, JJ Grzymiski, H Ducklow. Seasonal dynamics in Antarctic marine bacterioplankton community composition reveals adaptations to polar winter. Polar and Alpine Microbiology meeting Banff, AB, Canada, May.
- 2008 Murray, AE, JJ Grzymiski, H Ducklow. Ecological genomics reveals a high degree of temporal variation in Antarctic marine bacterioplankton assemblages. Marine Sciences College, USF, St. Petersburg, Florida, April.
- 2007 Murray, AE, JJ Grzymiski, H Ducklow. Ecological consequences of seasonality on species composition in Antarctic bacterioplankton communities. Integrated Microbial Diversity Symposium, Canadian Institute for Advanced Research, Vancouver BC, Canada, October.
- 2007 Murray, AE, JJ Grzymiski. Integrated approaches open doors to understanding how life thrives in extreme environments. Symposium on Aquatic Microbial Ecology, Faro, Portugal, September.
- 2006 Murray, AE. Detecting life in isolated habitats – examples from Lake Vida, an ice-covered lake in the Mcmurdo dry valleys. New Zealand Microbiological Society, Hamilton, New Zealand, November.
- 2006 Murray, AE, JJ Grzymiski, B Campbell, M Kapralevic, R Feldman, C Cary. From the southern cold waters to the deep hot vents, environmental genomics reveals clues to adaptation, function and diversity. New Zealand Microbiological Society, Hamilton New Zealand, November.
- 2005 Murray, AE, B Campbell, J Grzymiski, R Feldman, M Kapralevic, C Cary. Environmental genomics of an extreme symbiosis – a window into complexity and lifestyle. American Society of Microbiology General Meeting, Atlanta, Georgia, June.
- 2005 Murray, AE. Marine microbes of the Antarctic. CAML Workshop Brussels, Belgium, May.
- 2005 Murray, AE, JJ Grzymiski, B Campbell, R Feldman, M. Kapralevic, C Cary. Linking community structure and function through ecological genomics in polar and hydrothermal cent ecosystems. Seminar, Virginia Institute of Marine Sciences, Virginia, March.
- 2004 Murray, AE. Microbial genomics goes to the environment – where some like it hot, and others like it cold. 2nd Annual Genes in Ecology, Ecology in Genes Symposium, Overland Park, Kansas. October.
- 2004 Murray, AE, JJ Grzymiski. Eco-genomic explorations into Antarctic bacterioplankton communities. 2nd Okasaki Biology Conference “Terra Microbiology”. Ise Shima National Park, MielPearl Japan, September.
- 2004 Murray, AE. Extreme life. “In the Light of Science” Seminar Series, Northern Nevada Science Coalition. Reno, Nevada, September.
- 2004 Murray, AE, JJ Grzymiski, BJ Carter. Microbial diversity and dynamics in Antarctic picoplankton revealed by microarray analyses. American Society of Microbiology General Meeting, New Orleans, Louisiana, May.

- 2004 Murray, AE. Prokaryotic diversity and community structure in Lake Tahoe – are there themes in oligotrophic environments. Department of Civil and Environmental Engineering UC Davis, California, March.
- 2004 Murray, AE, JJ Grzymski, C Cary. Microbial environmental genomics. British Antarctic Survey, Workshop on Antarctic Genomics, Cambridge, United Kingdom, August.
- 2003 Murray, AE. Bridging the gap between extreme environments and their microbial inhabitants. Joint Genome Institute, California, July.
- 2003 Murray, AE, JJ Grzymski, BJ Carter. Development of DNA microarrays for detection of archaeal and bacterial nucleic acids from marine waters of the Antarctic Peninsula. Workshop on Cold Adaptations of Aquatic Microorganisms. Max Plank Institute for Marine Microbiology, Bremen, Germany, May.
- 2003 Murray, AE. Genomics applications to the study of life in extreme environments. Seminar. University of Southern California, Department of Biological Sciences, California, April.
- 2003 Murray, AE. New frontiers in environmental microbial ecology: molecular applications from the small subunit rRNA through genomics. Environment Sciences and Health, UNR, Reno, Nevada, April.
- 2003 Murray, AE. Genomics applications to the study of diversity and gene expression in Antarctic picoplankton. American Society for Limnology and Oceanography Annual Meeting, Salt Lake City, Utah, February.
- 2002 Murray, AE. New applications of molecular tools: microarrays in microbial ecology. NSF MO-LEEx Workshop, Arlington, Virginia, September.
- 2002 Murray, AE. Environmental genomics – exploring diversity and gene expression in microbial assemblages. EECB EcoLunch Seminar Series, University of Nevada, Reno, Nevada, September.
- 2002 Murray, AE. Use of DNA microarrays to study relatedness among microbes – implications for ecological applications Canadian Society for Microbiology Annual Meeting, Saskatoon, Saskatchewan, Canada, June
- 2002 Murray, AE. Microbial genomics and the environment. Nevada Genomics and Integrative Approaches to Abiotic Stress Scientific Conference, Lake Tahoe, Nevada, May.
- 2002 Murray, AE. Bacterioplankton molecular ecology in West Antarctic waters. Seminar. Alfred Wegner Institute for Polar and Marine Research, Bremerhaven, Germany, April.
- 2001 Murray, AE, C Cruz, X Qiu, J Zhou, K Nealson, D Lies, JM Tiedje. Functional genomics of *Shewanella oneidensis*, str. MR-1: variation in gene expression during growth with different electron acceptors. International Symposium on Microbial Ecology, Amsterdam, Netherlands, August.
- 2001 Murray, AE, C Cruz, X Qiu, J Zhou, K Nealson, D Lies, JM Tiedje. Use of microarrays for assessing microbial genome diversity and gene expression – tools for natural product discovery. Society for Industrial Microbiology Annual Meeting, St. Louis, Missouri, July
- 2001 Murray, AE. Microbial genomics goes to the environment. Nevada EPSCoR Annual Genomics Scientific Conference, Lake Tahoe, Nevada, May.
- 2001 Murray, AE, C Cruz, X Qiu, J Zhou, K Nealson, D Lies, JM Tiedje. Microarray detection of genetic variability in the genus *Shewanella*. American Society for Microbiology Annual Meeting, Orlando, Florida, May.
- 2001 Murray, AE. Application of DNA microarrays to assess microbial gene expression. Scripps Institute of Oceanography, La Jolla, California, May.
- 2000 Murray, AE C Cruz, X Qiu, J Zhou, K Nealson, D Lies, JM Tiedje. *Shewanella oneidensis* MR-1 gene expression. Department of Marine Sciences, University of Georgia, Athens, Georgia, October.
- 1999 Murray, AE. DOE/NABIR Workshop, Applications of genomic technology to bioremediation. Arlington, Virginia, December.
- 1999 Murray, AE. Microarray Algorithms and Statistical Analyses: Methods and Standards, Lake Tahoe, California, November.
- 1999 Murray, AE. ASM Microbial Biodiversity Meeting, Chicago, Illinois, August.
- 1998 Murray, AE. Center for Microbial Ecology, Michigan State University, East Lansing, Michigan, December.

- 1998 Murray, AE. Molecular applications to Southern Ocean bacterioplankton. School of Ocean, Earth Sciences and Technology, University of Hawaii, Honolulu, Hawaii, November.
- 1998 Murray, AE and EF DeLong. Antarctic marine bacterioplankton ecology. Department of Marine Sciences, University of Georgia, Athens, Georgia, May.
- 1998 Murray, AE. Applications of DGGE to Antarctic picoplankton. Woods Hole Oceanographic Institution, Biology Department, Woods Hole, Massachusetts, January.
- 1997 Murray, AE, EF DeLong. Santa Barbara Channel archaeoplankton ecology. Biology Department, California Polytechnic State University, San Luis Obispo, California, March.
- 1996 Murray, AE, EF DeLong. Use of DGGE in microbial ecology. Biology Department, California Polytechnic State University, San Luis Obispo, California, March.
- 1995 Murray, AE, JT Hollibaugh. DGGE analysis of estuarine bacterioplankton. Central Coast Biological Society, San Luis Obispo, California, February.

CONFERENCE ACTIVITIES (across 17 countries)

Contributed talks (73)

- 2022 Murray, AE, E Lundin, D Kweku, A Panorska, Z Harrold, S Kasas. Detecting the vibrations of life. AbSciCon 2022. Atlanta, Georgia, May.
- 2021 Murray, AE, C-C Lo, HE Daligault, NE Avalon, D Eveillard, K Davenport, M Tresguerres, BJ Baker, PSG Chain. Metagenome-enabled insights into host-microbe ecology of a macrolide-producing Antarctic ascidian microbiome. Pacificchem 2021 International Chemical Congress of Pacific Basin Societies, Honolulu HI. Virtual, December.
- 2021 Murray, AE, E Lundin, Z Harrold, A Panorska, L Venturelli, NM Ernster, S Kasas, G Dietler. Detection of active life at the nanoscale using a novel nanomotion detection system. Pacificchem 2021 International Chemical Congress of Pacific Basin Societies, Honolulu HI. Virtual, December.
- 2021 Avalon, NE, AE Murray, P SG Chain, H Daligault, K Davenport, A Dichosa, C-C Lo, BJ Baker. Elucidation of the biosynthetic gene cluster for palmerolide A, a potent marine macrolide from an Antarctic ascidian. Pacificchem 2021 International Chemical Congress of Pacific Basin Societies, Honolulu HI. Virtual, December.
- 2021 Murray, AE, -C Lo, HE Daligault, NE Avalon, RW Read, KW Davenport, ML Higham, Y Kunde, AEK Dichosa, BJ Baker, and PSG Chain. Discovery of an Antarctic ascidian-associated uncultivated Verrucomicrobia that encodes antimelanoma palmerolide biosynthetic capacity. US-SCAR. Virtual. July.
- 2021 Ernster, NM, D Alvarez-Ponce, A Luzuriaga, BJ Baker, AE Murray. Mining Antarctic ascidian-associated bacterial genomes reveals numerous biosynthetic gene clusters and signatures of cold adaptation. US-SCAR. Virtual. July.
- 2021 Murray, AE., NM Ernster, Z Harrold, R Quinn, C Zacny, B Christner, A Ichimura. Biosignature detection using the analyzer of nanoscale textures for objects in near-surface ice on Europa (ANTONIE). Europa Lander Instrument Workshop, Virtual. Pasadena, California, May.
- 2020 Avalon, NE, AE Murray, S Kokkaliari, C-C Lo, HE Daligault, PSG Chain, BJ Baker. Microbiome metagenomics of an Antarctic ascidian to guide the discovery of the palmerolide biosynthetic gene cluster. Microbiome Club – Webinar Series, University of South Florida, Tampa, FL, June.
- 2020 Avalon, NE*, AE Murray, C-C Lo, S Kokkaliari, PSG Chain, BJ Baker. The search for the biosynthetic gene cluster of a potent Antarctic marine macrolide. 18th Annual Raymond N. Castle Student Research Conference, University of South Florida, Tampa, FL, March.
- 2020 Murray, AE, NE Avalon, C-C Lo, K Davenport, H Daligault, M Higham, L Bishop, S. Kokkaliaria, C. Riesenfeld, A Dichosa, P Chain, BJ Baker. Ascidian microbiome metagenomics: in search of the palmerolide biosynthetic gene cluster. Gordon Research Conference on Marine Natural Products. Ventura, California, February.
- 2019 German, C, AE Murray, A Rhoden, K Arrigo. Network for Ocean Worlds. Outer Planets Advisory Group. Houston Texas, February.

- 2019 Baker, BJ, N Avalon, N, AE Murray. Mass spectrometric applications to natural products drug discovery. SouthEast Regional Meeting of the American Chemical Society (SERMACS), Savannah, Georgia, October.
- 2019 Avalon, NE, AE Murray, CC Lo, AEK Dichosea, K Davenport, PSG Chain, BJ Baker. Harnessing the Molecular Assembly Lines from an Antarctic Sea Squirt to Fight Cancer, 3MT Competition, University of South Florida, Tampa, Florida, October. (Oral Communication – College of Arts & Sciences Heat Winner)
- 2019 Avalon, NE, AE Murray, S. Kokkaliari, C-C Lo, AEK Dichosa, K Davenport, P. Chain, A.E. Murray, B.J. Baker. Establishment of the Core Microbiome of the Ascidian *Synoicum adareanum* near Palmer Station, Antarctica, XVI MaNaPro and XI ECMNP Joint Conference, Peniche, Portugal, September.
- 2019 Chou, L., F Kenig, AE Murray. The nature of legacy biosignatures in cold-limited, slow-growing ecosystems. Astrobiology Science Conference, June 2019, Seattle Washington.
- 2019 Murray, AE, RB Proksch, JM Birch, BC Christner, ZR Harrold, M Hecht, S Jesse, S Kasas, D Pargett, WT Pike, A Ponce, CA. Scholin, U Staufer, L Venturelli, and KH Williford. Biosignature detection using the Analyzer of Nanoscale Textures for Objects in Near-surface Ice on Europa (ANTONIE) and other icy ocean worlds. Astrobiology Science Conference, Seattle Washington, June.
- 2019 Venturelli, L, ZR Harrold, G Dietler, AE Murray, S Kasas. Looking for life using the nanomotion detection technique. Astrobiology Science Conference, Seattle Washington, June.
- 2019 Murray, AE, NE Avalon, LG Bishop, KW Davenport, AKE Dichosa, M Higham, S Kokkaliari, CC Lo, PSG Chain, BJ Baker. Microbiome explorations of a unique macrolide-producing Antarctic ascidian. 2nd Synthetic Biology for Natural Products Conference, Puerto Vallarta, Mexico, June.
- 2018 Harrold, ZR, L Venturelli, N Patel, F Azam, B Christner, R Wilaert, G Dietler, S Kasas, AE Murray. Investigating atomic force microscopy as a biosignature detection tool in Europa-analogue samples. AGU Fall Meeting, Washington DC, December.
- 2018 Harrold, ZR, L Venturelli, N Patel, F Azam, B Christner, R Wilaert, G Dietler, S Kasas, AE Murray. Investigating the value of atomic force microscopy and force distance measurements for biosignature detection in Europa-analogue samples. Extremophiles, Ischia, Italy, September.
- 2018 Priscu, JP, J Dore, KP Hand, Y Liu, P Matheus-Carnevali, AB Michaud, and AE Murray. Methane transformations in arctic and Antarctic ice-covered lakes. 34th Congress of the International Society of Limnology, SIL 2018, Nanjing, China, August.
- 2018 Kasas, S, AE Murray, L Venturelli, Z Harrold, AC Kohler, G Dietler. Chemistry-independent detection based on nanomotion sensing technology. Planetary Exploration 2061. Lausanne Switzerland, April.
- 2018 Kasas, S, AE Murray, G Dietler. AFM-based living organism nanomotion detection. Annual Linz Winter Workshop: Advances in Single-Molecule Research for Biology & Nanoscience. Linz Austria, February.
- 2017 Hand, KP, AE Murray, J Garvin and the Europa Lander Science Definition team, Project Science Team, and Project Engineering Team. Science Goals, Objectives, and Investigations of the 2016 Europa Lander Science Definition Team Report, American Astronomical Society, Division for Planetary Sciences Meeting October, Provo, Utah.
- 2017 Murray, AE, G Ferrell, A Harpold, E Hausrath, H Moosmuller, D Obrist, R Schumer, S Tyler. Building capacity in Interdisciplinary snow sciences for a changing world. NASA EPSCOR Statewide meeting. Las Vegas, NV, October.
- 2017 Murray, AE, R Young, D Eveillard, BJ Baker. Structure and function of the core microbiome associated with the natural produce producing Antarctic ascidian, *Synoicum adareanum*. SCAR Biology Meeting, Leuven Belgium, July.
- 2017 Bishop, L, N Avalon, BJ Baker, CS Riesenfeld AE Murray. Bacterial goldmines: Understanding the genomic basis of natural product biosynthesis in a new Antarctic strain of the *Pseudovibrio* genus. UNR Biotechnology Symposium, Reno, Nevada, May.
- 2017 Avalon, NE, L Bishop, D Chaput, AE Murray, BJ Baker. The biosynthetic potential of Antarctic *Pseudovibrio* sp. TunPHSC05-14. Frontiers of Drug Discovery and Infectious Diseases, University of South Florida, Tampa FL, May.

- 2017 Murray AE, Y Shen, C Gimpel, R Benner. Microbes and the Molecular Signatures They Leave: Signs of Life from Our Own Ocean World. Astrobiology Science Conference, Mesa AZ, April, 2017.
- 2016 Proemse, BC, AE Murray, C Schallenberg, B McKiernan, BT Glazer, SA Young, NE Ostrom AR Bowie, ME Wieser, F Kenig, PT Doran, R Edwards. Coupled abiotic and biological cycling of elements in subsurface brine in Antarctic Lake Vida, Victoria Valley. SCAR Open Science Conference. Kuala Lumpur, Malaysia, August.
- 2016 Harrold, ZR, EM Hasurath, CL Bartlett, AH Garcia, O Tschauner, AE Murray, J Raymond. Bioavailability of mineral-bound iron to a snow algae community and implications for life in extreme environments. Nevada NASA EPSCoR Statewide Meeting, Reno, Nevada, April.
- 2015 Ostrom, NE, H Gandhi, G Trubl, AE Murray. The enigmatic nitrogen biogeochemistry of the cryoecosystem of Lake Vida, Victoria Valley, Antarctica. International Conference on Nitrification, Edmonton, Canada, June.
- 2015 Kenig, F, L Chou, WA Jackson, CP McKay, PT Doran, AE Murray, CH Fritsen. Perchlorate and volatiles in brine of Lake Vida (Antarctica): Implication for the analysis of mars sediments. ABSCICON, Chicago, Illinois, June.
- 2014 Priscu, JC, H Adams, J Dore, KP Hand, P Matheus Carnevali, AB Michaud, AE Murray, MS Skidmore, T Vick-Majors. Sources and sinks of methane in aquatic environments beneath polar ice. AGU Fall meeting, San Francisco, California, December.
- 2014 Murray, AE, H Ducklow, J. Ghiglione, J Grzymski, C Arnosti. Ecosystem processes through the 'eyes' of Antarctic Peninsula bacterioplankton during winter. SCAR Open Sciences Meeting. Auckland, New Zealand. August.
- 2014 Samburova, V, AG Hallar, DH Lowenthal, LR Mazzoleni, AE Murray, X Yang, B Zielinska. Analysis of atmospheric biological and organic aerosols collected at high elevation mountain site (Storm Peak Laboratory). Global Fair and Workshop on Long-Term Observatories of Mountain Social-Ecological Systems. Reno, Nevada, July.
- 2014 Matheus-Carnevali, P, AE Murray. Methane sources in arctic thermokarst lakes of the North Slope of Alaska. Goldschmidt Meeting, Sacramento, California. June.
- 2013 Ostrom, NE, AE Murray, G Trubl and E Kuhn. The enigmatic nitrogen biogeochemistry of Lake Vida, Antarctica: an isolated brine cryoecosystem. AGU Fall Meeting. San Francisco, California, December.
- 2013 Matheus Carnevali, PB, J Dodsworth, AE Murray. Microbial isolation from terrestrial 'icy worlds'. Polar and Alpine Microbiology Meeting, Big Sky, Montana, September.
- 2013 Kuhn E, CH Fritsen, H Dugan, V Peng, J Memmott, PT Doran, and AE Murray. Microbial life in the 18 to 27 m ice core section recovered from Lake Vida, Antarctica. Polar and Alpine Microbiology Meeting, Big Sky, Montana, September.
- 2013 Murray, AE, K Billis, T Glavina del Rio, M Gollery, E Kuhn, A Pati, V Peng, N Varghese. Biogeochemical potential of Lake Vida brine microbiota – geochemical and 'omic' evidence. 14th International SCAR Biology Symposium. Barcelona, Spain. July.
- 2013 Cawley, KM, DM McKnight, A Stubbins, PG Hatcher, H Chen, P Doran, and AE Murray. Chemical characteristics of dissolved organic matter (DOM) in Lake Vida Brine. Association for the Science of Limnology and Oceanography, New Orleans, Louisiana, February.
- 2012 Ghiglione, JF, P Galand, T Pommier, D Kirchman, C Lovejoy, C Pedrós-Alió, AE Murray. Pole to Pole biogeography of surface and deep marine bacterial communities. 14th International Symposium on Microbial Ecology, Copenhagen, Denmark, August.
- 2012 Murray, AE, JF Ghiglione, PE Galand, T Pommier, EW Maas, D Kirchman, C Lovejoy, C Pedrós-Alió. Comparisons between bacterioplankton from the Southern Ocean and Arctic Ocean provide perspective on distinctiveness of polar marine systems. SCAR Open Sciences Conference, Portland, Oregon, July.
- 2012 Galand, P, JF Ghiglione, T Pommier, E Maas, D Kirchman, C Lovejoy, C Pedrós-Alió, AE Murray. Pole to Pole biogeography of surface and deep marine bacterial communities. ASLO, Aquatic Sciences Meeting, Shiga, Japan, July.

- 2012 Ostrom, NE, AE Murray, G Trubl, E Kuhn. The enigmatic nitrogen biogeochemistry of Lake Vida, an isolated brine cryoecosystem. International Symposium on Isotopmers, Washington D.C., June.
- 2012 Kuhn, E, AE Murray, CH Fritsen, FE Löffler, P Doran. Addressing the Lake Vida cryobrine microbial community lifestyle: 'Omics approaches to survey biogeochemical processes of a salty, freezing, ice-sealed ecosystem. AbSciCon, Atlanta, Georgia, April.
- 2012 Matheus-Carnevali, J Dodsworth, E Kuhn, M Rohrsen, AE Murray. Methanogenic archaea in Arctic thermokarst lakes in Alaska. Geobiology Symposium, UC Riverside, California, April.
- 2011 Murray, AE, NE Ostrom, BT Glazer, CP McKay, F Kenig, F_Löffler, CH Frisen, PT Doran. Stable isotopic signatures in the isolated brine cryoecosystem of Lake Vida reveal evidence of both abiotic and biotic processes. AGU Fall Meeting. San Francisco, California, December.
- 2011 Murray, AE, A comparison of Southern and Arctic Ocean bacterioplankton - are the poles still apart after pyrotag analysis? Microbes: Ecology and Biogeochemistry Symposium, Barcelona, Spain, September.
- 2010 Ghiglione, JF, AE Murray. Comparison of massively parallel deep sequencing and molecular profiling to evaluate the seasonal changes in Sub-Antarctic and Antarctic marine bacterioplankton communities. Microcycles, Banyuls sur Mer, France, May
- 2009 Murray, AE and K Hand. Astrobiology of Icy Worlds. NASA Space Grant Meeting, Reno, Nevada, September.
- 2009 Cawley, KM, DM McKnight, P Doran, and AE Murray. Dissolved organic matter (DOM) in Lake Vida Brine is older, more concentrated, and less aromatic than in nearby Antarctic Lakes. Humic Science and Technology Conference, Boston, Massachusetts, March.
- 2007 Murray, AE, CH Fritsen, F Kenig, CP McKay, PD Doran. Microbial life in cold brines collected from Permanently ice-covered Lake Vida, Antarctica. ASLO Aquatic Sciences Meeting, Santa Fe, New Mexico, February.
- 2007 Passow, U, C De La Rocha, C Arnosti, H Grossart, AE Murray, A Engel. Overview of a mesocosm experiment investigating the impact of phytoplankton on the microbial loop. ASLO Aquatic Sciences Meeting, Santa Fe, New Mexico, February.
- 2007 Grzymiski, JJ, AE Murray, M Kaplarevic, RF Feldman, BJ Campbell, GR Gao, SC Cary. Environmental genome analysis of the *Alvinella pompejana* epibiont consortia. ASLO Aquatic Sciences Meeting, Santa Fe, NM, February.
- 2007 Fritsen, CH, AE Murray, PD Doran, F Kenig, CP McKay. Low temperature brine beneath the 20 meter ice cover of Lake Vida: access, geochemistry and cells. ASLO Aquatic Sciences Meeting, Santa Fe, NM, February.
- 2006 Grzymiski, JJ and AE Murray. Antarctic bacterial genome sequence analysis suggests widespread cold adaptation. SCAR Open Sciences Conference, Hobart, Australia, July.
- 2006 Murray, A.E. and JJ Grzymiski. Diversity and genomic signatures of coastal Antarctic bacterioplankton. Alpine and Polar Microbiology Meeting, Innsbruck, Austria, March.
- 2005 Grzymiski, J, B Carter, A Murray. Comparative genomic analysis of six Antarctic microbial genome fragments reveals psychrophilic signatures. ASLO Aquatic Sciences Meeting, Salt Lake City, Utah, February.
- 2005 Fritsen, CF, AC Mosier, AE Murray. Molecular information from dynamic ice covers: is the information consistent with the dynamics? ASLO Aquatic Sciences Meeting, Salt Lake City, Utah, February.
- 2004 Cary, SC, R Feldman, G Gao, J Garcia-Frias, G Luther, R Daniel, M Kaplarevic, J Zhang, A Ghadiri, AE Murray. A metagenome analysis of an extreme microbial symbiosis. 10th International Symposium on Microbial Ecology Cancun, Mexico, August.
- 2004 Murray, AE, B Carter, J Grzymiski. Bridging the gap between the Antarctic marine environment, prokaryotic diversity and function. SCAR Open Science Conference, Bremen, Germany, July.
- 2003 Cary, SC, BJ Campbell, A Ghadiri, RA Feldman, J Stein, AE Murray, J Garcia-Frias, G Gao, R Daniel, G Luther. Metagenomic analysis of the episymbiont community associated with *Alvinella pompejana*, a deep-sea hydrothermal vent polychaete. ASLO Aquatic Sciences Meeting, Park City, Utah, February.

- 2003 Stewart, FJ, CH Fritsen, AE Murray, BJ Carter, Prokaryotic diversity in Antarctic sea ice: inter-habitat variability. ASLO Aquatic Sciences Meeting, Park City, Utah, February.
- 2001 Murray, AE, D P Lies, G Li, KH Neelson, J Zhou, J M Tiedje. Advances in DNA microarray technology: establishing connections in microbial ecology and evolution. ASLO Aquatic Sciences Meeting, Albuquerque, New Mexico, February.
- 2000 Murray, A E, D P Lies, G Li, K H Neelson, J Zhou, and J M Tiedje. Application of DNA microarrays to assess relatedness between microorganisms at the gene level. Northwest Conference on Microarrays, Seattle, Washington, September.
- 1998 Murray, AE, CM Preston, R Massana, LT Taylor, A Blakis, EF DeLong. Temporal variability in bacterioplankton assemblage composition - comparing polar versus temperate environments. AGU/ASLO Ocean Sciences Meeting, San Diego, California, February.
- 1997 Murray, AE, CM Preston, A Blakis, R Massana, KY Wu, EF DeLong, W. Jeffrey. Spatial and temporal variation in the picoplankton: examples from temperate and polar ecosystems. ASLO Aquatic Sciences Meeting, Santa Fe, New Mexico, February.
- 1996 Massana, R AE Murray, CM Preston, PD Fowler, and EF DeLong. Relative abundance, distribution and diversity of planktonic archaeobacterial phylotypes in the Santa Barbara Channel. AGU/ASLO Ocean Sciences Meeting, San Diego, California, February.
- 1994 Murray, AE, JT Hollibaugh, and C Orrego. San Francisco Bay bacterioplankton community composition investigated using a new molecular approach. AAAS Meeting, San Francisco, California, June.
- 1994 Murray, AE, JT Hollibaugh, C Orrego. A new molecular approach for describing diversity in coastal bacterioplankton communities. AGU/ASLO Ocean Sciences Meeting, San Diego, California, February.
- 1993 Murray, AE, JT Hollibaugh, C Orrego. Do bacterioplankton community composition, estuarine carbon source and thymidine metabolism have anything in common? A molecular approach to a geochemical and ecophysiological question. Estuarine Research Federation Meeting, Hilton Head, South Carolina, November.

Posters (100)

- 2022 Murray, AE, NE Avalon, C-C Lo, H Daligault, M Higham, E Delage, D Eveillard, KW Davenport, AKE Dichosa, S Kokkaliari, PSG Chain, BK Baker. Microbiome metagenomic explorations of a unique Antarctic ascidian. ISME-18, Lausanne, Switzerland, August.
- 2021 Sweetlove, M, Y-M Gan, AE Murray, A Van de Putte. POLA₃R: an online portal for DNA-based biodiversity and ecological data from the poles. World Microbe Forum. Virtual, June.
- 2021 Ernster, NM, D Mars, A Ichimura, R Quinn, AE Murray. Optical microscopy and AFM as complimentary tools in detecting signs of life in ocean world analog samples. Nevada Space Grant and NASA EPSCoR Statewide meeting. Virtual, Nevada, April.
- 2021 Seixas, M, AE Murray. Informing models of life in ocean World brines: lessons from active microbial life in briny waters of Lake Vida at -13 C. Nevada Space Grant and NASA EPSCoR Statewide meeting. Virtual, Nevada, April.
- 2021 Sweetlove, M, Y-M Gan, AE Murray, A Van de Putte. POLA₃R: an online portal for DNA-based biodiversity and ecological data from the poles. Research Data Alliance (RDA) 17th Plenary Meeting. Virtual, April.
- 2020 Daligault, H, AE Murray, C-C Lo, Y Kunde, NE Avalon, A Dichosa, K Davenport, BJ Baker, PSG Chain. Genome assembly of a Palmerolide A producing microbe that lives in association with the Antarctic tunicae *Synoicum adareanum*. 15th Annual Sequencing, Finishing, Analysis in the Future (SFAF). Virtual, Los Alamos, December.
- 2020 Avalon, NE, AE Murray, CC Lo, AEK Dichosa, K Davenport, PSG Chain, BJ Baker. The biosynthetic gene cluster for palmerolide A from a host-associated bacterium from the Antarctic ascidian *Synoicum adareanum*. Gordon Research Conference on Marine Natural Products. Ventura, California, February.

- 2020 Murray, AE, K Arrigo. Taking a planetary science-inspired look at Earth's sea ice-ocean interface – a hot spot for interactions of life, chemical and physical exchange. AGU Ocean Sciences Meeting, San Diego, California, February.
- 2020 German, CR, KR Arrigo, AE Murray, A Rhoden, BE Schmidt. Oceanography beyond Earth: A frontier in ocean sciences. AGU Ocean Sciences Meeting, San Diego, California, February.
- 2019 Rhoden, AR, AE Murray, CR German. Developing a NASA Astrobiology Research Coordination Network for Ocean Worlds. EPSC-DPS2019-882. Geneva, Switzerland, September.
- 2019 German, C, AE Murray, A Rhoden, K Arrigo. Network for Ocean Worlds. Outer Planets Advisory Group, Boulder Colorado, August.
- 2019 Harrold, ZR, L Venturelli, N Patel, F Azam, B Christner, R Willaert, G Dietler, S Kasas, AE Murray. Nanomotion detection: a novel tool for investigating psychrophile activity. Astrobiology Science Conference, Seattle Washington, June.
- 2019 German, C, AE Murray, A Rhoden. Network for Ocean Worlds. Astrobiology Science Conference, Seattle Washington, June.
- 2019 Lundin, EM, LG Bishop, CS Riesenfeld, BJ Baker, AE Murray. Characterization of *Pseudovibrio* str. Tun.PSC04.5I4, a psychrophilic symbiont isolated from *Synoicum adareanum*. Biotechnology Symposium, UNR, Reno, Nevada, May.
- 2018 Murray, AE, L Chou, F Kenig, CH Fritsen, PT Doran. Forecasting habitability through the ice-sealed lens of Antarctica's Lake Vida. AGU Fall Meeting, Washington, DC, December.
- 2018 Murray, AE, AP Van De Putte, B Danis, L Cabrol, M Barret. Biogeographically-linked resource to share polar microbial & environmental data. POLAR-18, Davos, Switzerland, June.
- 2018 Bishop, L, N Avalon, C Riesenfeld, BJ Baker, AE Murray. Phylogenomic association and biosynthetic gene potential in a new Ascidian-associated Antarctic *Pseudovibrio* strain Tun.PSC04-5.I4. ASM Microbe, American Society for Microbiology, Atlanta, GA, June.
- 2018 Avalon, N, L Bishop, D Chaput, AE Murray, BJ Baker. The use of computational de novo sequencing and predictive databases for identification of secondary metabolites from Antarctic *Pseudovibrio* sp. Tun.PHSC04-5I4. 66th ASMS Conference on Mass Spectrometry and Allied Topics, San Diego, California, June.
- 2018 Hand, KP, AE Murray, J Garvin, S Horst, W Brinkerhoff, K Edgett, T Hoehler, MJ Russell, A Rhoden, A Yingst, C German, B Schmidt, C Paranicas, D Smith, P Willis, A Hayes, B Ehlmann, J Lunine, A Templeton, K Nealson, B Christner, M Cable, K Craft, R Pappalardo, A Hofmann, T Nordheim, C Phillips. Science goals, objectives, and investigations of the 2016 Europa Lander Science Definition Team report. European Geophysical Union, Vienna, Austria, April.
- 2018 Ingels, J, and the NSF Workshop participants (37 authors). Antarctic ecosystem research following ice shelf collapse and iceberg calving events. MEASO 2018, Hobart, Tasmania, April.
- 2018 Avalon, NE, L Bishop, AE Murray, BJ Baker. Predictive Databases, Computational Peptide Sequencing, and Secondary Metabolite Identification from a New Antarctic *Pseudovibrio* species. Castle Conference. Tampa, FL, March, 2018.
- 2018 Harrold, Z, L Venturelli, P Stupar, R Willaert, S Kasas, AE Murray. Establishing the value of force distance measurements in detecting signs of life in Europa-analog samples. Advances in Single-Molecule Research for Biology and Nanoscience, Linz Winter Workshop. Linz, Austria, January.
- 2017 Murray AE, Y Shen, C Gimpel, R Benner. Microbes and the Molecular Signatures They Leave: Signs of Life from Our Own Ocean World. Astrobiology Science Conference, Mesa Arizona, April.
- 2017 Russell, MJ, KP Hand, AE Murray. The possible emergence of life and differentiation of a shallow biosphere on Europa. Astrobiology Science Conference, Mesa Arizona, April.
- 2017 Garcia, AH, EM Hausrath, ZR Harrold, O Tschauer, AE Murray, J Raymond, CL Bartlett. Iron-bearing minerals as a trace nutrient source for snow algae communities. UNLV Geosymposium, Las Vegas, Nevada, April.
- 2017 Hand, KP, AE Murray, J Garvin, S Horst, W Brinkerhoff, K Edgett, T Hoehler, MJ Russell, A Rhoden, A Yingst, C German, B Schmidt, C Paranicas, D Smith, P Willis, A Hayes, B Ehlmann, J Lunine, A

- Templeton, K Neelson, B Christner, M Cable, K Craft, R Pappalardo, A Hofmann, T Nordheim, C Phillips. Science goals, objectives, and investigations of the 2016 Europa Lander Science Definition Team Report. Astrobiology Science Conference, Mesa Arizona, April.
- 2017 Harrold, ZR, EM Hausrath, AE Murray, O Tschauner, AH Garcia, A Lanzirrotti, MA Marcus, M Newville, CL Bartlett, J Raymond. Iron-bearing minerals as a trace nutrient source for snow algae communities and implications for mineral biosignature formation. Astrobiology Science Conference, Mesa Arizona, April.
- 2016 Harrold, Z, E Hausrath, OD Tschauner, AE Murray, MA Maracus, A Larnzirotti, M Newville, AG Garcia, CL Bartlett, JA Raymond. Snow algae-microbe-mineral interactions and implications for snow algae growth. AGU Fall Meeting, San Francisco, California, December.
- 2016 Barret, M, L Cabrol, C Lavergne, P Aguilar, F Thalasso, A Sepulveda, K Martinez, L Gandois, R Teisserenc, AE Murray, A Van de Putte, N Youdjou, C Etchebehere, M Svenning, A Tveit, J Fochesatto, N Tananev. Diversity and activity of methane-linked microbial communities in high latitude ecosystems affected by climate change. French Association of Microbial Ecology, Marseille, France, June.
- 2016 Chaney, M, ML Higham, ND Beres, H Moosmüller, EM Hausrath, C Kitts, AE Murray. Temporal and spatial distributions of snow microbiota in the Sierra during a low snow deposition year. College of Science and Math Student Research Conference, Cal Poly State University, San Luis Obispo, California, May.
- 2016 Beres, ND, D Sengupta, EM Hausrath, AE Murray, H Moosmüller. Determining the influence of aerosol deposition on the biological, geochemical and radiative properties of snowpack. Nevada NASA EPSCoR Statewide Meeting, Reno, Nevada, April.
- 2016 Bishop, L, A Lee, ML Higham, A Yau, JR McConnell, AE Murray. Preliminary investigations of microbial abundance preserved in the Holocene glaciological record in the northern Antarctic Peninsula. Nevada NASA EPSCoR Statewide Meeting, Reno, Nevada, April.
- 2016 Chaney, M, ML Higham, ND Beres, H Moosmüller, EM Hausrath, AE Murray. Temporal and spatial distributions of snow microbiota in the Sierra during a low snow deposition year. Nevada NASA EPSCoR Statewide Meeting, Reno, Nevada, April.
- 2016 Lee, A, L Bishop, ML Higham, CH Fritsen, AE Murray. Development of a protocol for enumeration of bacteria in a several thousand-year-old frozen Antarctic sediment. Nevada NASA EPSCoR Statewide Meeting, Reno, Nevada, April.
- 2015 Hausrath, E, C Bartlett, A Garcia, O Tschauner, AE Murray, J Raymond. Interactions between snow-adapted organisms, minerals and snow in a Mars-analog environment, and implications for the possible formation of mineral biosignatures. AGU Fall Meeting, San Francisco, California, December.
- 2015 Kenig, F, L Chou, CM McKay, W. Jackson, PT Doran, AE Murray, CH Fritsen. Perchlorate and volatiles in the brine of Lake Vida (Antarctica): Implication for the analysis of Mars sediments. AGU Fall Meeting, San Francisco, California, December
- 2015 Chou, L, F Kenig, AE Murray, PT Doran, CH Fritsen. Metabolomics and the legacy of previous ecosystems: a case study from the brine of Lake Vida (Antarctica). AGU Fall Meeting, San Francisco, California, December.
- 2015 Chou, L, F Kenig, AE Murray, PT Doran, CH Fritsen. The lipidomics of the brine of Lake Vida (McMurdo Dry Valleys, Antarctica): Discerning between legacy biomarkers and current metabolism of a cold isolated microbial ecosystem. ABSCICON, Chicago, Illinois, June.
- 2015 Mayer, S, AE Murray, P Matheus Carnevali. Visualization of Arctic methanogenic archaeal and bacteria co-cultures by fluorescent in situ hybridization. NASA EPSCoR Research Symposium, Las Vegas, Nevada, May.
- 2014 Gimpel, C, E Weiss, C Reiss, AE Murray. Sea ice influence on winter microbial community around Elephant Island. SCAR Open Science Meeting, Auckland, New Zealand. August.
- 2014 Young, RM, AE Murray, BJ Baker. Symbiont microbiome of the Antarctic tunicate *Synoicum adareanum*: a multi'omic approach. Marine Natural Products, Gordon Research Conference. Ventura, California, March.

- 2014 Gimpel, C, E Weiss, C Reiss, AE Murray. Winter picoplankton in open vs. sea ice covered waters of the South Shetland Islands region. Ocean Sciences Meeting, Honolulu, Hawaii, February.
- 2013 Matheus Carnevali, PB, AE Murray. Biological methane production from autochthonous organic matter in Arctic thermokarst lake sediments. Gordon Research Conference on Geobiology. Ventura, California, February.
- 2012 Trubl, G, E Kuhn, A Ichimura, C Fritsen, M Madigan, AE Murray. Biogeochemistry and genetic potential related to denitrification of heterotrophic bacteria isolated from Lake Vida brine. AGU Fall Meeting, San Francisco, California, December.
- 2012 Kuhn, E., AE Murray, H Dugan, AS Ichimura, R Edwards, V Peng, CH Fritsen, F Kenig, S Young, PT Doran. Microbial life in the iron-rich, anoxic cryobrine of Lake Vida, Antarctica. SCAR Open Science Conference, Portland, Oregon, July.
- 2012 Trubl, G, E Kuhn, N Ostrom, AE Murray. Denitrification in microorganisms isolated from ice-sealed Lake Vida brine. 56th Annual Meeting of the Arizona-Nevada Academy of Science, Glendale Arizona, April.
- 2012 Murray, AE, BJ Baker, R Read, CS Riesenfeld. Microbial community structure of the palmerolide-producing Antarctic ascidian, *Synoicum adareanum*. Marine Natural Products, Gordon Research Conference. Ventura, California, March.
- 2011 Kuhn, E, A Ichimura, V Peng, C Fritsen, AE Murray. Characterization of the abundant < 0.2 mm cell-like particles inhabiting Lake Vida brine, McMurdo Dry Valleys, Antarctica. AGU Fall Meeting, San Francisco, California, December.
- 2011 Matheus-Carnevali, P, M Rohrsen, J Dodsworth, E Kuhn, M Williams, P Santibanez Avila, H Adams, D Berisford, K Hand, J Priscu, K Walter Anthony, G Love, B Hedlund, AE Murray. Archaea in Arctic thermokarst lake sediments. AGU Fall Meeting, San Francisco, California, December.
- 2011 Dugan, H, PT Doran, CH Fritsen, F Kenig, AE Murray, S Arcone. A 26 m ice cover on Lake Vida, Antarctica. AGU Fall meeting, San Francisco, California, December.
- 2011 Murray, AE, JJ Grzymiski, T Williams, M DeMaere, R Cavicchioli. Ecosystems biology reveals shifts in Antarctic bacterioplankton structure and function. Microbial drivers of ecosystem complexity, Keystone Symposia, Breckenridge, Colorado, March.
- 2010 Kuhn, E, JJ Grzymiski, AE Murray. Comparative genomic analysis of marine GI crenarchaeota environmental genome fragments. 13th International Symposium on Microbial Ecology, Seattle, Washington, August.
- 2010 Lam, J, JK Gu, R Brock, M Oates, AE Murray. Evaluating snow microbial assemblages. UNLV, UROP, Las Vegas, Nevada, August.
- 2010 Murray, AE, M.Vernet, V Peng, C Tyler, P Wagh, A Cefarelli. Variability of bacterioplankton and phytoplankton in the western Weddell Sea as a function of proximity to icebergs. Ocean Sciences Meeting, Portland, Oregon, February.
- 2010 Grzymiski, JJ, CS Riesenfeld, AE Murray. Bacterioplankton adaptations to Antarctic winter. Ocean Sciences Meeting, Portland, Oregon, February.
- 2010 Straza, TR, H Ducklow, AE Murray, DK Kirchman. Abundance and single-cell activity of bacterial groups in Antarctic waters. Ocean Sciences, Portland, Oregon, February
- 2009 Cuce, J, CS Riesenfeld, AE Murray, BJ Baker. The search for palmerolide A in cultures of *Synoicum adareanum*. Xth SCAR International Biology Symposium Sapporo, Hokkaido, Japan, July.
- 2009 Cuce, J, CS Riesenfeld, AE Murray, BJ Baker. The search for palmerolide A in cultures of *Synoicum adareanum*. 50th Anniversary Meeting of the American Society of Pharmacognosy, Honolulu Hawaii, June.
- 2009 Grzymiski, JJ, CS Riesenfeld, AE Murray. Seasonal dynamics of Antarctic bacterioplankton revealed by metagenomics. Joint Genome Institute User's meeting. Walnut Creek, California, March.
- 2008 Riesenfeld, CS, J Grzymiski, AE Murray. Seasonal Dynamics of Antarctic Bacterioplankton Revealed by Metagenomics. 16th Annual International Meeting on Microbial Genomics. Lake Arrowhead, California, September.

- 2007 Myers, K, M Erickson, AE Murray, H Ducklow. Response of bacterioplankton communities to inorganic and organic nutrient enrichments at Palmer Station, Antarctica. SAME10, Faro, Portugal, September.
- 2007 Dussaq, A., CS Riesenfeld, BJ Baker, AE Murray. Isolation of a Palmerolide-producing microorganism. Nevada INBRE Summer Fellowship Program, Reno, Nevada, August.
- 2007 Kaplarevic, M and AE Murray ENGЕНИUS – Environmental Genome Informational Utility System. Conference on computational systems bioinformatics San Diego, California, August.
- 2007 Riesenfeld, CS, AE Murray, BJ Baker. Evidence for biosynthesis of palmerolide natural products by polyketide synthetases within bacterial symbionts of the Antarctic tunicate *Synoicum adareanum*. ASM General Meeting, Toronto, Canada, May.
- 2007 Wagh, P and AE Murray. Growth and isolation of anaerobic bacteria from Lake Vida, Antarctica. UNR Undergraduate Research Series. Reno, Nevada, May.
- 2006 Murray, AE, BJ Carter. Microbial Life in Lake Tahoe. Science as a tool in Lake Tahoe Basin Management. Incline, Nevada, October.
- 2006 Grzymiski, JJ, Murray, AE, Kaplarevic, M, Feldman, R, Campbell, BJ, Gao, GR and SC Cary. Environmental genome analysis of the *Alvinella pompejana* epibiont consortia. 14th International Meeting on Microbial Genomics, Lake Arrowhead, California, September.
- 2006 Myers, K, A Murray, M Erickson, N Middaugh, H Quinby, H Ducklow. Bacterial dynamics and diversity in Antarctic Seas. LTER All-Scientists' Meeting, Estes Park, Colorado, September.
- 2006 Doran, PT CH Fritsen, F Kenig, A Murray. Ice-sealed Lake Vida, McMurdo Dry Valleys: Lessons on entry and cleaning procedures. Subglacial Antarctic Lake Environments Advanced Science and Technology Planning Workshop, Grenoble, France, April.
- 2005 Murray, AE, J Grzymiski, B Carter, E DeLong. Antarctic picoplankton diversity and genomics investigations reveal unique populations of cold-adapted microorganisms. IX SCAR Biology Meeting, Curitiba, Brazil, July.
- 2005 Grzymiski, JJ, AE Murray. Environmental gene expression from coastal Antarctic waters using a DNA microarray. International Union of Microbial Scientists. San Francisco, California, July.
- 2005 Cruz-Garcia, C, J Klappenbach, AE Murray, JM Tiedje. NapA is the enzyme responsible for the reduction of nitrate in *Shewanella oneidensis*, MR-1. ASM General Meeting, Atlanta, Georgia, June.
- 2005 Cruz-Garcia, C AE Murray, JM Tiedje. Elucidation of the role of EtrA in the nitrate reduction pathway in *Shewanella oneidensis* MR-1. International Union of Microbial Scientists. San Francisco, California, July.
- 2005 Cary, SC, BJ Campbell, R Feldman, G Gao, J Grzymiski, M Kaplarevic, and AE Murray. A metagenome analysis of an extreme microbial symbiosis. Biocomplexity in the Environment Awardees Meeting, Arlington, Virginia. March.
- 2005 Fouke, B, M Kandianis, T Schickel, K Zimmerman, AE Murray, A Kameda, B Carter, N Goldenfeld, J Veysey, and P Chan. Physical, chemical, and biological controls on the emergence of terraced carbonate mineralization at Mammoth Hot Springs, Yellowstone National Park. Biocomplexity in the Environment Awardees Meeting, Arlington, VA. March.
- 2004 Schickel, T, KM Zimmerman, J Veysey, A Kameda, AE Murray, N Goldenfeld, and BW Fouke, Hot springs and Pond lips: understanding controls of precipitation rates on carbonate terraced architecture at Spring AT-3, Angel Terrace, Mammoth Hot Springs, Yellowstone National Park, Wyoming, USA. GSA, Salt Lake City, Utah, November.
- 2004 Mosier, AC, AE Murray, CH Fritsen. Microbial diversity and spatial variability in the perennial ice cover of Lake Vida, McMurdo Dry Valleys, Antarctica. 10th International Symposium on Microbial Ecology Meeting Cancun, Mexico, August.
- 2004 Murray, AE, Fritsen, C, B Carter. Prokaryotic diversity and community structure in Lake Tahoe – Comparisons to other freshwater environments. 10th International Symposium on Microbial Ecology, Cancun, Mexico, August.
- 2004 Cruz-García, C, AE Murray, J Tiedje. Dissimilatory Nitrate Reduction into Ammonium is the Pathway Responsible for Growth-Associated Reduction of Nitrate in *Shewanella oneidensis* MR-1. ASM General Meeting, New Orleans, Louisiana, May.

- 2004 Mosier, AC, AE Murray, JC Priscu and CH Fritsen. Assessment of microbial populations in the 19-meter ice cover of Lake Vida, Antarctica. ASM General Meeting, New Orleans, Louisiana, May.
- 2004 Kaplarevic, M, J Zhang, SC Cary, BJ Campbell, S Bench, G Gao, AE Murray. Design and development of a metagenome sequence database and annotation pipeline. ASM General Meeting, New Orleans, Louisiana May.
- 2004 Mosier, AC AE Murray, and CH Fritsen. Abiotic stresses in Lake Vida's permanent ice cover. Workshop on Integrative Approaches to Abiotic Stress across Biological Disciplines, Lake Tahoe, California, May.
- 2004 Kameda, A, AE Murray. Genomic DNA screening for functional genes specific to biogeochemically important metabolic pathways in the depositional facies of Angel Terrace, Mammoth Hot Springs, Yellowstone National Park, U.S.A. Workshop on Integrative Approaches to Abiotic Stress across Biological Disciplines, Lake Tahoe, California, May.
- 2004 Grzymiski, J, B Carter, AE Murray, A 40Kb fosmid sequence of an Antarctic Gematimonadetes bacterium. Workshop on Integrative Approaches to Abiotic Stress across Biological Disciplines, Lake Tahoe, California, May.
- 2004 Carter, B, CH Fritsen, AE Murray. Prokaryotic Diversity and Community Structure in Lake Tahoe. Workshop on Integrative Approaches to Abiotic Stress across Biological Disciplines, Lake Tahoe, California, May.
- 2004 Murray, AE, CH Fritsen, B Carter. Prokaryotic Diversity and Community Structure in Lake Tahoe. Research as a Tool in Tahoe Basin Issues - 2nd Biennial Conference on Tahoe Environmental Concerns," Lake Tahoe, California, May.
- 2004 Mosier, AC AE Murray, CH Fritsen and PT Doran. Microbial assemblages in the 19-meter ice cover of Lake Vida, Antarctica as a potential analogue to icy environments beyond Earth. AbSciCon, Moffet Field, California, March.
- 2004 Bar-Cohen, Y, S Sherrit, Z Chang, L Wesel, X Bao, P T Doran, C H Fritsen, F Kenig, C P McKay, AE Murray, T Peterson. Subsurface ice and brine sampling using an ultrasonic/sonic gopher for life detection and characterization in the McMurdo Dry Valleys. Submitted to SPIE 11th Annual International Symposium on Smart Structures and Materials, San Diego, California, March.
- 2003 Fouke, B, G Bonheyo, N Goldenfeld, H Garcia, J Veysey, B Carter, A Murray. Biotic and abiotic controls on the emergence of terraced carbonate mineralization. Biocomplexity PI meeting, Washington D.C., September.
- 2003 Cary, SC, AE Murray, R Feldman, J Garcia-Frias, G Luther, G Gao, R Daniel, J Stein, M Kaplarevic, J Zhang, N Shah, BJ Campbell. A metagenome analysis of an extreme microbial symbiosis. Biocomplexity PI meeting, Washington D.C., September.
- 2003 Cruz-Garcia, C, AE Murray, JM Tiedje. Dissimilatory nitrate reduction to ammonium is the pathway responsible for the nitrate reduction in *Shewanella oneidensis*, MR-1. 11th International Conference on Microbial Genomes, Durham, North Carolina, September.
- 2003 Kameda, A, B Carter, A Ghadiri, R F Feldman, AE Murray. Using environmental contig assemblies to identify marine picoplankton diversity and open reading frames for DNA microarray development. American Society of Limnology and Oceanography, Aquatic Sciences Meeting, Salt Lake City, Utah. February.
- 2002 Murray, AE, EF DeLong, and BJ Carter. Towards an Understanding of Microbial Diversity and Gene Expression in Antarctic Picoplankton. American Society of Microbiology 102nd General Meeting, Salt Lake City, Utah, May.
- 2000 Murray, AE, D P Lies, G Li, K H Nealson, J Zhou, J M Tiedje. Relatedness among microorganisms assessed by gene specific DNA:DNA hybridizations to DNA microarrays. 8th Conference on Small Genomes, Lake Arrowhead California, September.
- 1999 Murray, AE, GS Li, D Lies, KH Nealson, JZ Zhou, JM Tiedje. Applications of DNA microarray technology to investigating gene expression in *Shewanella oneidensis* MR-1 and functional diversity among related species. 7th Conference on Small Genomes, Arlington Virginia, November.

- 1999 Murray, AE, GS Li, JZ Zhou, JM Tiedje. Use of DNA microarrays for estimating functional diversity and relatedness among metal reducing bacteria. Microarray Algorithms and Statistical Analyses: Methods and Standards, Lake Tahoe, California, November.
- 1999 Murray, AE, S Straszewski, and EF DeLong. Assaying marine microbial assemblages: phylogenetic affiliations, community structure and environmental influences. ASM Microbial Biodiversity Meeting, Chicago, Illinois, August.
- 1998 Murray, AE, DM Karl, and EF DeLong. Influences of the polar front on bacterial community composition in Drake Passage. International Society of Microbial Ecology 8th Meeting, Halifax, Nova Scotia, Canada, August.
- 1998 Murray, AE, R Massana, A Blakis, S Straszewski, and EF DeLong. Time series analysis of planktonic archaea in the Santa Barbara Channel. American Society of Microbiology 98th General Meeting, Atlanta Georgia, May.
- 1996 Murray, AE, CM Preston, KY Wu, and EF DeLong. Molecular analysis of marine *Archaea* and *Bacteria* of the Antarctic Peninsula. American Society of Microbiology 96th General Meeting, New Orleans Louisiana, May.

TEACHING & MENTORING EXPERIENCE

Courses

- 2019 Arctic Microbiomes Field School: From Molecules and Microbes to Ecosystems and Health. Whapmagoostui-Kuujuarapik, Nunavik, Canada. Invited instructor for this intensive, international field course for graduate students. July.
- 2018 Microbial Diversity and Evolution (MICR 401/601), UNR. 3.0 unit lecture and discussion based course Spring 2018 at the undergraduate and graduate level. Offered through the Molecular Microbiology and Immunology Department.
- 2015 Microbial Oceanography: Genomes to Biomes, UH. Intensive graduate and Postdoctoral training course for students with interests in marine microbiology and biological oceanography. Sponsored by the Agouron Institute, SOEST, NSF and C-MORE. Honolulu, Hawaii, June.
- 2010 Nevada Geobiology Summer Short Course, UNR. NASA Space Grant sponsored intensive field and laboratory course targeting graduate students in science and science education fields. Reno, Nevada July.
- 2010 Integrative Biology and Adaptation of Antarctic Marine Organisms. An NSF-sponsored intensive field and laboratory course held at McMurdo Station, Antarctica. Director: Prof. D. Manahan, USC, Los Angeles, January.
- 2008 Integrative Biology and Adaptation of Antarctic Marine Organisms. An NSF-sponsored intensive field and laboratory course held at McMurdo Station, Antarctica. Director: Prof. D. Manahan, USC, Los Angeles, January.
- 2006 Integrative Biology and Adaptation of Antarctic Marine Organisms. An NSF-sponsored intensive field and laboratory course held at McMurdo Station, Antarctica. Director: Prof. D. Manahan, USC, Los Angeles, January.
- 2004 Current Topics in Microbial Ecology Seminar, Dept. Environ. Sciences & Health, UNR, Spring.
- 2001 Integrative Biology and Adaptation of Antarctic Marine Organisms. An NSF-sponsored intensive field and laboratory course held at McMurdo Station, Antarctica. Director: Prof. D. Manahan, USC, Los Angeles, January.

Teaching Assistantships

- 2000 Integrative Biology and Adaptation of Antarctic Marine Organisms, January.
- 1999 Integrative Biology and Adaptation of Antarctic Marine Organisms, January.
- 1996 Marine Microbiology, Ecology, Evolution, and Marine Biology Dept., UCSB, Winter.
- 1996 Marine Microbiology Lab, Ecology, Evolution, and Marine Biology Dept., UCSB, Winter.
- 1995 General Biology, Ecology, Evolution, and Marine Biology Dept., UCSB, Spring.

Training workshops (organized and instructed)

- 2018 Davos mARS Biodiversity and Bioinformatics Hands-On Training Workshop – POLAR 18. Davos, Switzerland, June.
- 2012 Next Generation Sequencing at the Poles practical training workshop; Liège, Belgium, November.
- 2007 Molecular Phylogenetics Computer Training Workshop for ARB, DRI, Reno, Nevada, July.
- 2001 Denaturing Gradient Gel Electrophoresis (DGGE) training workshop. East Lansing, Michigan, October.
- 1998 Denaturing Gradient Gel Electrophoresis (DGGE) training workshop. MBL, Woods Hole, Massachusetts.
- 1995 Denaturing Gradient Gel Electrophoresis (DGGE) training workshop. UCSB, Santa Barbara, California, July.
- 1994 Denaturing Gradient Gel Electrophoresis (DGGE) training workshop. SFSU, San Francisco, California, October.

Mentoring

Postdoctoral researchers:

- 2021 Dr. Nicole Avalon, (external mentee) University of South Florida (Biological chemistry)
- 2020-21 Dr. Luoth Chou, (external mentee) Georgetown University (Cryosphere brine systems)
- 2018–19 Dr. Pamela Santibanez (Paleoclimate and microbiology of ice)
- 2017–19 Dr. Zoe Harrod (Geochemistry, Geomicrobiology and Astrobiology)
- 2006-09 Dr. Christian Riesenfeld (NSF Biological Informatics Fellow)
- 2004-07 Dr. Joseph Grzymiski (Environmental genomics and bioinformatics)

Graduate students (Primary mentor, supervisor, committee chair)

- 2019-21 Nathan Ernster (Cell and Molecular Biology, MS, UNR)
- 2019-20 Eric Lundin (Biotechnology, MS, UNR)
- 2017-18 Lucas Bishop (Biotechnology MS, UNR)
- 2012- Carla Gimpel (Fulbright Graduate Fellow, Marine Biology Graduate Program, Ph.D., UH)
- 2009-15 Paula Matheus-Carnevali (Biochemistry and Molecular Biology, Ph.D., UNR)
- 2009-14 Emanuele Kuhn, (Fulbright Graduate Fellow, Biochemistry and Molecular Biology, Ph.D., UNR)
- 2011-13 Gareth Trubl, (Environmental Science, M.S., UNR)
- 2009-11 Protima Wagh (Joint B.S./M.S. Biotechnology Program, M.S., UNR)
- 2003-06 Alexandra Kameda (Environmental Sciences and Health, M.S., UNR)
- 2002-04 Annika Mosier (Environmental Resource Sciences, M.S., UNR) (co-chair)

Graduate students (committee member)

- 2022- Stephanie Suarez (Department of Chemistry, Ph.D., University of South Florida, Tampa, Florida)
- 2021 David Kweku (Statistics and Data Science, M.S., UNR)
- 2021- Kevin Axelrod (Atmospheric Sciences Graduate program, Ph.D., UNR)
- 2018 –20 Nicole Avalon (Department of Chemistry, Ph.D., University of South Florida, Tampa, Florida)
- 2017 -19 Luoth Chou (Earth and Environmental Sciences, University of Illinois, Chicago, Illinois)
- 2017-19 Nic Beres (Atmospheric Sciences Graduate program, Ph.D., UNR)
- 2015-16 Courtney Bartlett (Geosciences, M.S., UNLV)
- 2012-15 Tim Alba (Biology, Ph.D., UNLV)
- 2007-09 Kristen Myers, (Ecology, Evolutionary Biology, M.S., Brown University/Marine Biology Laboratory)
- 2004-08 Sara Nassar, (Computer Science and Engineering, Ph.D., UNR)
- 2003-07 Kendra Zamzow, (Environmental Sciences and Health, Ph.D., UNR)
- 2003-07 Mihailo Kaplarevic (Computer Engineering, Ph.D., U. Delaware)
- 2002-04 Nipesh Shah (Computer Science, M.S. UNR)
- 2001-02 Sarah Marshall (Environmental Sciences and Health, M.S., UNR)
- 1999-02 Claribel Cruz-Garcia (Soil Sciences, Ph.D. MSU)

Postgraduate training interns

2022 David Kweku (Statistics, M.S., UNR, 2021)
2020-21 Miranda Seixas (Geobiology, B.A., Middlebury College, 2020)
2020 Eric Lundin (Biotechnology, UNR, 2020)
2017 Nathan Ernster (Chemistry, UNR, 2010)
2015-16 Michael Blane (Mathematics, UNR, 2014)
2014 Michael Gary (Biochemistry and Molecular Biology, UNR; M.S Prep)
2013 Olivia Rassuchine (Biology, UCSC, 2011)
2011 Robert Read (Biochemistry and Molecular Biology, UNR, 2010)
2010 Protima Wagh (Biotechnology, UNR, 2009)

Undergraduate students

2021-22 Jaiden Christopher (Biochemistry and Molecular Biology, UNR)
2021 Lauren Siao (Molecular Microbiology and Immunology, BS, UNR)
2019 Miranda Seixas (Geobiology, BA, Middlebury College)
2017-19 Eric Lundin (Biotechnology, BS/MS Program, UNR)
2015-16 Lucas Bishop (Biotechnology, BS/MS program, UNR)
2015-16 Alena Lee (Biotechnology, BS/MS program, UNR)
2015-16 Mikaela Chaney (Microbiology, Cal Poly State Univ.)
2013-15 Samantha Mayer (Biochemistry and Molecular Biology, UNR)
2012-13 Olivia Rassuchine, (Biochemistry and Molecular Biology, UNR)
2010-11 Mike Bleyberg, (Biology, UNR)
2009-10 Robert Read, (Biochemistry and Molecular Biology, UNR)
2009 Doug Yao, (Nursing, UNR)
2008 Laura Kreidberg (Astronomy and Physics, Yale)
2007-09 Charlotte Tyler, (Biochemistry and Molecular Biology, UNR)
2006-07 Protima Wagh, (Biotechnology (BS/MS program, UNR)
2006-08 Alex Dussaq, (Biochemistry and Molecular Biology, UNR)
2004-06 Scott Lucas, (Biology, UNR)
2005 Devin Currie, (Biology, UM Amherst)
2003 Jason Michaels, (Biochemistry and Molecular Biology UNR)
2002 Alexandra Kameda (Biology, UNR)

High School Students

2006 Alex Dussaq
2005 Kaitlyn Shakleton
2003 David Shakleton

SCIENTIFIC FIELD EXPERIENCE AND CRUISES

2016 Methanobase: Expedition to Patagonia ponds, permafrost and wetlands Chile, Field team member
2015- Sierra Nevada Crest, Lake Tahoe Basin, Mt. Lassen National Park and Mammoth Lakes Snow Surveys (Jan-May), field team leader
2014 South Shetland Islands/Elephant Islands, Antarctic Peninsula, Nathaniel B. Palmer, cruise planner/ lead of team that participated
2013 Arctic Tundra Lakes, Barrow, Alaska, field team member
2013 South Shetland Islands/Elephant Islands, Antarctic Peninsula, Nathaniel B. Palmer, cruise scientist
2013 Arctic Tundra Lakes, Barrow, Alaska, field team member

- 2012 South Shetland Islands/Elephant Islands, Antarctic Peninsula, Nathaniel B. Palmer, cruise planner/lead of team that participated
- 2012 Arctic Tundra Lakes, Barrow, Alaska, field team member
- 2010-11 McMurdo Station and McMurdo Dry Valleys (Lake Vida), Antarctica, field team member
- 2010 Arctic Tundra Lakes, Barrow, Alaska, field team member
- 2010 McMurdo Station, Antarctica, Field course: Integrative Biology and Adaptation of Antarctic Marine Organisms, Instructor
- 2009 Arctic Tundra Lakes, Barrow, Alaska, field team member
- 2009 Weddell Sea, RV Nathaniel B. Palmer, cruise scientist
- 2008 McMurdo Station, Antarctica, Field course: Integrative Biology and Adaptation of Antarctic Marine Organisms, Instructor
- 2008 Palmer Station, Antarctica, Field team leader, Station Science Leader
- 2006 McMurdo Station, Antarctica, Field course: Integrative Biology and Adaptation of Antarctic Marine Organisms, Instructor
- 2005 McMurdo Station and McMurdo Dry Valleys (Lake Vida), Antarctica, field team member
- 2004 9° North, East Pacific Rise, RV Atlantis and DSV Alvin, cruise scientist
- 2003 9° North, East Pacific Rise, RV Atlantis and DSV Alvin, cruise scientist
- 2002 Palmer Basin, RV Laurence M. Gould, cruise scientist
- 2002 Palmer Station, Antarctica, Field team leader, Station Science Leader
- 2001 Palmer Station, Antarctica, Field team leader
- 2001 McMurdo Station, Antarctica, Field course: Integrative Biology and Adaptation of Antarctic Marine Organisms, Instructor
- 2000 McMurdo Station, Antarctica, Field course: Integrative Biology and Adaptation of Antarctic Marine Organisms, Teaching Assistant
- 1999 McMurdo Station, Antarctica, Field course: Integrative Biology and Adaptation of Antarctic Marine Organisms, Teaching Assistant
- 1996 Palmer Station, Antarctica, science team member
- 1996 Drake Passage/Bransfield Strait, RV Polar Duke, cruise scientist
- 1995 Palmer Station, Antarctica, science team member
- 1995 Drake Passage/Bransfield Strait, RV Polar Duke, cruise scientist

DATA PRODUCTS

- Murray, AE, C-C Lo, HE Daligault, NE Avalon, RW Read, KW Davenport, ML Higham, Y Kunde, AEK Dichosa, BJ Baker, and PSG Chain (2021), Supplementary information provided with Murray et al. “Discovery of an Antarctic ascidian-associated uncultivated Verrucomicrobia with antimelanoma palmerolide biosynthetic potential.”, Dryad, Dataset, <https://doi.org/10.5061/dryad.8sf7m0cpp>.
- Microbial Antarctic Resource System (mARS) by Murray A, Van de Putte A, Youdjou N, Danis B is licensed under a Creative Commons Attribution 4.0 International License.
- Winter Picoplankton Diversity and Distribution in the US Antarctic Marine Living Resources Study Area - Northern Antarctic Peninsula. SCAR - Microbial Antarctic Resource System. Metadata Dataset <https://doi.org/10.15468/Ozsina>.
- Antarctic Peninsula Bacterioplankton 16S rRNA gene surveys and metagenomes from Winter 2002 and Summer 2006. SCAR - Microbial Antarctic Resource System. Metadata Dataset <https://doi.org/10.15468/m2o4ab>.
- Marine bacterioplankton community structure in the vicinity of Antarctic icebergs. SCAR - Microbial Antarctic Resource System. Metadata Dataset <https://doi.org/10.15468/fwpqqc>.

SERVICE TO PROFESSION

Peer Review

Refereed papers

Antarctic Science, Applied and Environmental Microbiology, Aquatic Microbial Ecology, Archives of Microbiology, Biology Letters, Deep Sea Research, Ecology, Environmental Microbiology, Extremophiles, FEMS Microbial Ecology, Frontiers in Marine Science, Frontiers in Microbiology (editor), Geomicrobiology Journal, Hydrobiologia, ISME Journal, Limnology and Oceanography (L&O), L&O Methods, Journal of Experimental Marine Biology and Ecology, Journal of the Marine Biological Association of the United Kingdom, Marine Biology, Marine Biodiversity, Medicinal Research Reviews, Microbial Biotechnology, Microbial Ecology, Molecular Ecology, Molecular Biology and Evolution, Nature, mSphere, Nature Communications, Nature Microbiology, Nature Reviews Microbiology, PLoS ONE, PeerJ, Polar Biology, and Proceedings of the National Academy of the USA.

Proposals

USA: National Science Foundation (NSF) (Biological Oceanography, Dimensions of Biodiversity, Division of Environmental Biology, Microbial Observatories, Biocomplexity, Biogeosciences, Polar Programs, Cell and Molecular Biology), National Aeronautics and Space Administration (NASA) Astrobiology and Exobiology, Lewis and Clark Fund for Exploration and Field Research, National Geographic Society, National Oceanic and Atmospheric Administration, National Sea Grant, Ohio Plant Biotechnology Consortium, Marine Science and Technology Foundation, Gordon and Betty Moore Foundation.

International: National Environmental Research Council - British Antarctic Survey, Natural Sciences and Engineering Research Council of Canada, Canada Foundation for Innovation, Chilean Antarctic Institute - INACH, Chile, Netherlands Organization for Scientific Research, ACS Petroleum Research Fund, Australian Antarctic Program, NSERC (Canada), Austrian Science Fund, Italian National Research in Antarctica Program (PNRA), National Research Foundation – South Africa, Program, National Research in Antarctica (Italy), New Zealand Antarctic Research Institute.

Panel Participation

NSF Biological Oceanography, Arctic Natural Sciences and Arctic System Sciences, Antarctic Organisms and Ecosystems, C-DEBI Annual Review Site Visit Lead; NASA Astrobiology, Planetary Science and Technology through Analog Research, Planetary Data System and Exobiology; DOE Genomes to Life Program and Joint Genome Institute – Proposal Study Panel (2006-present), National Sea Grant Marine Biotechnology, Planetary Protection Program.

External Dissertation Examiner

University of New South Wales (3 as of 2021)

Committee Service

- 2021-22 National Academy of Sciences and Engineering Committee on Astrobiology and Planetary Science.
- 2020-21 National Academy of Sciences and Engineering Committee on a Mid-Term Assessment of NSF Progress on the 2015 Strategic Vision for Antarctic and Southern Ocean Research. Committee member.
- 2020- Organizing committee to develop the SeqCode, a nomenclature code for naming uncultivated and fastidious Bacteria and Archaea.
- 2016-17 Co-Chair, Europa Lander Science Definition Team, NASA
- 2004- SCAR Life Sciences Standing Group (2004-2015): AntEco Sector Leader in Ecoinformatics and Systems Biology (2013 – present), Expert Group in Antarctic Biodiversity Informatics (2012 – 2020); Biodiversity.aq (2013 – 2020); Census of Antarctic Marine Life Steering Committee (2005 – 2010); Coordinated Census of Antarctic Marine Microbes program (2007 – 2010). SCAR Marine Biodiversity Information Network steering committee (2007 – 2010) and Antarctic Biodiversity Information Network (ANTABIF) (2010 – 2012).
- 2009-12 Palmer Area Users Committee
- 2005-07 ASM Councilor

- 2003-05 ASM Alternate Councilor
- 2001-04 Palmer Area Users Committee

Editorship

- 2017-18 Antarctic Biology, Scale Matters, Special Topic, *Frontiers in Ecology and Evolution*, Editor
- 2014- *Frontiers in Marine Science and Microbiology* 'Aquatic Microbiology' Review Editor
- 2009 Guest Editor for Polar Microbiology Special Issue of *Environmental Microbiology* in honor of the International Polar Year, March.

Meeting organizer or session chair

- 2022 Roundtable Session Moderator: The Future of Microbial Taxonomy Under the SeqCode, ISME-18, Lausanne Switzerland, August.
- 2022 Session Chair: Oceans across the solar system. AbSciCon, Atlanta, Georgia, May.
- 2022 Session Chair: Ocean Science for Ocean Worlds. AGU Ocean Sciences Meeting, San Diego, February.
- 2021 Ocean Carbon and Biogeochemistry Workshop, Session on Ocean Worlds. Virtual. June.
- 2021 Path Forward for Naming the Uncultivated; International Workshops Feb. 4 and 11. Virtual. February.
- 2020 Network for Ocean Worlds Annual Steering Committee meeting, Virtual, October.
- 2020 Session Chair: Oceanography Beyond Earth: A Frontier in Ocean Sciences. AGU Ocean Sciences Meeting, San Diego, February.
- 2019 Network for Ocean Worlds Kick-off meeting organizer; NASA Ames, Sunnyvale, California, December.
- 2019 NASA Planetary Sciences Town Hall, Presentation to the Scientific community to introduce the Network for Ocean Worlds.
- 2017 SCAR Biology Meeting, Session Chair: Microbial communities & 'Meta-omics', Leuven, Belgium, July.
- 2016 Ocean Worlds Meeting, Scientific Organizing Committee, Woods Hole, August.
- 2015 ABSCICON – Astrobiology Science Conference, Science Organizing Committee, Chicago Illinois, June.
- 2014 Chair: Microbes, Diversity and Ecological roles in Antarctic Ecosystems. SCAR Open Sciences meeting, Auckland, New Zealand, August.
- 2012 Co-organizer Workshop on Next Generation Sequencing at the Poles, Liège, Belgium, November.
- 2010 Chair: Phylogenetics and phylogeography of Antarctic microbial systems. SCAR Open Sciences meeting Buenos Aires, Argentina, July.
- 2004 Organizer: Workshop on Integrated approaches to abiotic stress across disciplines. Kings Beach, California, May
- 2001 Chair: ASLO Aquatic Sciences meeting, Albuquerque, New Mexico, February.

Workshop participation

- 2022 Future of the Search for Life Workshop, sponsored by NASA's Network for Life Detection. (virtual), March-April.
- 2021 Brines across the Solar System, (virtual). October
- 2020 Network for Life Detection Criteria Workshop, NASA Ames Research Center, Sunnyvale CA, (virtual), September.
- 2020 Microimaging Across sSpatial and Temporal Scales. Virtual Workshop on the Integration of Life Sciences in Space. NASA-Ames Research Center, Sunnyvale, CA, June.
- 2020 The Future of Planet Microbe: A brainstorming workshop. AGU Ocean Sciences, San Diego, CA, February.
- 2019 Oceans Across the Solar System Workshop. NASA Ames Research Center, Mountain View, California, December.
- 2019 Europa Station Meeting to Discuss and Draft Communication to the Planetary Sciences and Astrobiology Decadal Survey. Stone Aerospace, Austin Texas, November.
- 2019 NSF "Microbial Systematics for the Next Decade – Databases for the Next Generation" workshop Joint Genome Institute, Walnut Creek, California, March.

- 2019 Breakthrough Discuss, Invitee and participant, University of California, Berkeley, California, April.
- 2018 NSF “Microbial Systematics for the Next Decade” workshop Hood River, Oregon, October.
- 2018 OceanX Ideation Workshop; Invited presenter “Light and Life” with Ken Caldiera, Carnegie Institute and participant in the workshop. Westport, Connecticut, April.
- 2018 Breakthrough Discuss, Invitee and participant, Stanford University, Palo Alto, California, April.
- 2017 NSF Antarctic Ecosystem Research following Ice Shelf Collapse and Iceberg Calving Events, Florida State University, Coastal and Marine Laboratory, Florida, November.
- 2015 Exploration of Ocean Worlds, National Geographic Society, Washington DC, October.
- 2015 Emerging bioinformatics approaches in microbial ecogenomics. EBAME Workshop. Brest, France, September.
- 2015 SCAR Cross Disciplinary Workshop “Interactions between biological and climate processes in the Antarctic”. Barcelona, Spain, September.
- 2015 NSF EarthCube Oceanography and Geobiology Environmental ‘Omics (ECOGEO) Research Coordination Network Workshop. Honolulu, Hawaii, September.
- 2014 NASA: Scoping for Interdisciplinary Coordinated Experiment of the Southern Ocean Carbon Cycle (ICESOCC) Workshop, Scripps Institute of Oceanography, La Jolla, California, September.
- 2013 NSF Geomicrobiology and Microbial Geochemistry Workshop, Chicago, Illinois, October.
- 2011 National Academy of Sciences Workshop: Lessons and Legacies of the International Polar Year, 2007 2008, Washington D.C., June.
- 2011 Antarctic Conservation workshop, planning for the next 50 years, Skukuza, South Africa, May.
- 2009 NSF Advisory committee on ocean global change and biological adaptation (2009 – 2010).
- 2003 Antarctic Genomics at the British Antarctic Survey, Cambridge, England, August.
- 2002 NSF MO-LEn Workshop, September.
- 2002 National Research Council Workshop on the Frontiers in Polar Biology in the Genomic Era, Lake Tahoe, California, September.
- 2001 NSF-sponsored Upstream Genomic Facility Action meeting and Department of Energy Visions Workshop, Newark, Delaware, June.
- 2000 American Academy of Microbiology Colloquium on Geobiology, Tucson, Arizona, December.

SERVICE TO DRI

- 2022 DEES Environmental Data Science Search Committee
- 2021- Division of Earth and Ecosystem Sciences, Division Advisory Group
- 2020 Promotions Committee for The Division of Earth and Ecosystems Science
- 2013-14 Program and Budget Committee
- 2012-15 DRI Faculty Senate; Secretary (2012-2014)
- 2012- Academic Committee
- 2012- Laboratory Committee
- 2012-14 Faculty Senate Executive Committee
- 2011- Research Affairs Council
- 2009-12 Sabbatical Committee
- 2007-09 Program and Budget Committee
- 2007-10 DRI Faculty Senate
- 2006 Division of Earth and Ecosystem Sciences, Division Advisory Group (2006 – 2009)
- 2005 Nevada EPSCoR Cognitive Information Processing. DRI Lead in Bioinformatics (2005 – 2008)
- 2002 Nevada EPSCoR Integrated Approaches to Abiotic Stress program, focal area leader (2002 – 2005)

SELECTED PRESS COMMUNICATIONS, POPULAR SCIENCE ARTICLES, and FEATURES IN TEXTBOOKS

- 2022 Living Snow Project featured on Reno KOLO TV: <https://www.kolotv.com/2022/06/21/dri-working-with-community-collect-snow-algae-samples/>

- 2022 Wired Magazine, Interview “The Almighty Squabble Over Who Gets To Name Microbes”
<https://www.wired.com/story/microbe-names-fight/>
- 2022 Antarctic Sun, <https://antarcticsun.usap.gov/science/4719/>
- 2022 Natural History Magazine featured our project in a science news article “Antarctic Sea Squirt contains melanoma-fighting bacteria”, March.
- 2022 The Scientist. <https://www.the-scientist.com/news-opinion/newly-renamed-prokaryote-phylo-cause-uproar-69578>, January.
- 2022 Labroots highlights our mSphere paper <https://www.labroots.com/trending/microbiology/22126/potential-anti-cancer-bacterium-found-antarctic-sea-squirt>
- 2022 Earth.com featured our mSphere paper <https://www.earth.com/news/promising-anti-cancer-treatment-discovered-in-sea-squirts/>
- 2021 NSF highlighted our mSphere article in “what’s hot in science” https://www.nsf.gov/discoveries/disc_summ.jsp?WT.mc_id=USNSF_1&cntn_id=304109&utm_medium=email&utm_source=govdelivery
- 2021 At least 25 different media outlets in at least 6 countries (with reach of > 113K people) picked up the news released by DRI from our publication in mSphere – e.g., <https://phys.org/news/2021-12-antarctic-sea-squirt-scientists-bacterial.html>
- 2021 Interview with Noah Glick on KUNR radio regarding Living Snow Project.
<https://www.kunr.org/post/see-pink-snow-mountains-researchers-want-sample#stream/0>
- 2021 Interview for Freethink.com - Snow algae <https://www.freethink.com/environment/pink-snow>
- 2021 The Scientist. <https://www.the-scientist.com/notebook/researchers-propose-automating-the-naming-of-novel-microbes--68411>
- 2020 NSF OPP Research news:
https://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=300845&org=OPP&from=news
- 2020 News Medical. <https://www.news-medical.net/news/20200626/Synocum-adareanum-can-provide-a-better-understanding-for-the-development-of-melanoma-specific-drug.aspx>
- 2020 Biotechnology Magazine. https://www.biotechniques.com/microbiology-virology/news_whats-in-a-name-scientists-propose-new-naming-system-for-uncultivated-bacteria/
- 2020 New York Times <https://www.nytimes.com/2020/01/05/science/europa-rover-antarctica.html>
- 2018 Astrobiology Magazine: <https://www.astrobio.net/alien-life/shallow-biospheres-exist-beneath-icy-ceilings-ocean-moons/>
- 2014 Brock, Biology of Microorganisms. 14th Edition. Eds. Madigan, Martinko, Stahl, and Clark. Lake Vida and life in extreme environments research featured highlight box in Chapter 1.
- 2013 Microbe Magazine. April. Journal Highlights. Viable Microbes in Lake Vida but Not Lake Vostok So Far.
- 2013 Huffington Post Live. March. Much to be discovered in Antarctica.
<http://live.huffingtonpost.com/r/segment/antarctica-research-station/51159e202b8c2a4b1c0005ad>
- 2013 Earth Magazine. March. Livin' La Vida Fria, Frozen Antarctic lake a uniquely extreme environment for life.
- 2013 Scott Polar Research Institute, Cambridge, UK, 27 February – 18 May. “Frozen Worlds - Earth's Polar regions to the icy moons of Jupiter exhibit.
- 2013 Integrative Animal Biology Edition: 1 Est. Pub Date: 02/28/2013. Highlighted research on the hydrothermal vent polychaete, *Alvinella pompejana* including my photo.
- 2012 Antarctic Sun “No small discovery” Microbial life found in extreme environment of Antarctica's Lake Vida”. <http://antarcticsun.usap.gov/science/contenthandler.cfm?id=2778>
- 2012 TV - BBC World News America
- 2012 Radio – featured interviews
- Deutschland Funk, (in German) Nov 27th, 2012.
 - Canadian Broadcasting Company (CBC) broadcast Nov 30th, 2012.
 - BBC Scotland, broadcast Nov 29th, 2012.
 - The Naked Scientists Show, England, broadcast Dec 2nd, 2012.

- Capital Public Radio – Insights Show Dec 3rd, 2012. <http://archive2.capradio.org/news/insight/2012/12/03/insight-dr-peter-mansoor--antarctic-bacteria--me-and-him-are-killing-english>.
 - NPR's Talk of the Nation Science Friday, Dec 7th, 2012. <http://www.npr.org/2012/12/07/166736408/-for-scifri-unlocking-a-lakes-bacterial-secrets-beneath-20-meters-of-ice>.
- 2012 Examples of other Lake Vida-related articles covering the PNAS paper (Nov. and Dec. of 400 total)
- Nature, News <http://www.nature.com/news/life-abounds-in-antarctic-lake-sealed-under-ice-1.11884>
 - The Guardian; <http://www.guardian.co.uk/world/2012/nov/26/antarctic-lake-vida-find-life>
 - BBC; <http://www.bbc.co.uk/news/science-environment-20501574>
 - Cosmos Magazine; <http://www.cosmosmagazine.com/news/6202/icy-antarctic-microbes-may-help-search-alien-life>
 - New Scientist; <http://www.newscientist.com/article/dn22535-lake-life-survives-in-total-isolation-for-3000-years.html>
 - LA Times; <http://www.latimes.com/news/science/sciencenow/la-sci-sn-beneath-50foot-ice-layer-an-antarctic-lake-full-of-life-20121127,0,3304661.story?track=rss>
 - NASA; http://science.nasa.gov/science-news/science-at-nasa/2012/30nov_lakevida/
- 2012 NSF News. December. Ancient Microbes Survive Beneath the Icy Surface of Antarctic Lake. http://www.nsf.gov/news/news_summ.jsp?cntn_id=126161&org=PLR&from=news
- 2012 NSF News. October. Freshwater flows into the arctic and southern oceans appear to determine the composition of microbial populations. http://www.nsf.gov/news/news_summ.jsp?cntn_id=125685&WT.mc_id=USNSF_51&WT.mc_ev=click
- 2012 PHYS&ORG 'News'. Vast differences in Antarctic and Arctic polar ocean microbial communities reported. <http://phys.org/news/2012-10-vast-differences-antarctic-arctic-polar.html>
- 2011 TV - Galileo, Germany. March. Producer Johannes Wiebus of Jynx Productions. I was featured in a German documentary on Nevada's Fly Geyser.
- 2009 Applied Biosystems Advancing Science Quarterly Newsletter and live interview. April. <https://learn.lifetechnologies.com/profiles/amurray>.
- 2008 Antarctic Sun, May. "The hotspot - Icebergs become source of nutrients for biological communities as they melt". <http://antarcticsun.usap.gov/printArticle.cfm?id=1426>
- 2008 Antarctic Sun, April. "Life in the cold and dark" Scientists head to Antarctica in winter to study small organisms with big ecosystem role. <http://antarcticsun.usap.gov/science/contentHandler.cfm?id=1403>
- 2007 American Museum of Natural History. Provided photos for "Water" exhibit. New York, NY.
- 2007 Microbiology – An Evolving Science, 2nd edition. Joan Slonczewski and John Foster. English and German Translations. Antarctic microbiology research highlighted in chapter with four of my pictures.
- 2005 National Geographic News. January. Deep Ocean Expedition Takes Science up a Level.
- 2004 National Geographic News. December. Students log on as scientists explore deep ocean. http://news.nationalgeographic.com/news/2004/12/1206_041206_hydrothermal_vents.html
- 2004 AxoBits Magazine. October. Genepix 400B Gets its sea legs
- 2004 Nevada Regents Review. Dr. Alison Murray: Life in Extreme Environments
- 2003 BioArray News. Alison Elizabeth Murray Sees Microarrays at Extremes of the Globe. <http://www.genomeweb.com/arrays/alison-elizabeth-murray-sees-microarrays-extremes-globe>
- 2003 Nevada Women. "What You Can't See Could Change Your Life"
- 2001 Antarctic Sun "Microbes, genomics, and the Southern Ocean - attempts to learn about who's out there and how they thrive in their frigid environment". http://genex2.dri.edu/LExEn/publications/Antarctic_Sun.pdf

SELECTED OUTREACH ACTIVITIES AND PUBLIC LECTURES

- 2022 Invited speaker at the Girls in STEM event at the Sierra Nevada Journeys camp (ages 11-14).

- 2022 Kodner, R, AE Murray, M Collins, “Living Snow Project”, presented to the Tahoe Environmental Research Center’s Science Speaks Series-April [<https://www.youtube.com/watch?v=hvGNtWcfYro>]
- 2020 Murray, AE. Palmer microbiomes – from the plankton to a sea squirt. Palmer Station, Antarctica (Virtual), September.
- 2017 Murray, AE From Antarctica to Space. SCAR Biology Meeting Public Session, Leuven Belgium, July.
- 2017 Hand, KP, AE Murray, J Garvin, Europa Lander Science Definition Team Report Town Hall. Astrobiology Science Conference, Mesa, AZ, April, 2017.
- 2017 Hand, KP, AE Murray, J Garvin, Europa Lander Science Definition Team Report Town Hall. Lunar and Planetary Sciences Conference, The Woodlands, Texas, March, 2017.
- 2014 Presentation to the Glen Duncan STEM Academy – “A scientist in your community”, Reno, Nevada, December.
- 2014 Space Science Telescope Institute Science Writer’s Workshop Panelist, Baltimore, Maryland, April.
- 2014 Women in Science and Engineering Seminar, “My Life as a Research Scientist” March. UNR, Reno, Nevada, March.
- 2013 Barrow Arctic Science Consortium Saturday Schoolyard presentation. November. “Microbes, methane and icy worlds”. Barrow Alaska.
- 2013 NASA Mars and Mojave Festival. March. Demonstrated the value in earth analog study sites of astrobiological relevance. Exhibition on the NASA Astrobiology Institute and DRI Earth and Ecosystem Sciences Research Program, including hands on demonstrations. Death Valley National Park, California.
- 2012 Co-organized and hosted French Adventurer-explorer Jean-Louis Etienne during his visit to DRI December.
- 2012 NASA Mars and Mojave Festival. March. Demonstrated the value in earth analog study sites of astrobiological relevance. Exhibition on the NASA Astrobiology Institute and DRI Earth and Ecosystem Sciences Research Program, including hands on demonstrations. Death Valley National Park, California.
- 2011 DRI Research Foundation Board. February. Presented talk entitled “Unraveling the code of the microbes”. Las Vegas, Nevada.
- 2010 McMurdo Station Science Lecture. December. Presented talk entitled “The Life and Brines of Lake Vida”. McMurdo Station, Antarctica.
- 2010 NSF Program Manager Presentation at NSF. March Featured Murray’s research “Coordination Action for Research activities on life in Extreme environments”.
- 2010 Atkasuk Elementary through High School. April. Presented talk entitled “NASA Astrobiology of Icy Worlds”. Engagement of Native Alaskan students. Atkasuk, Alaska.
- 2010 New Generations Rotary. March. Presented talk entitled “Lessons from the microbes: DNA stories of adaptation to extremes, plasticity, and life on a changing planet”.
- 2009 DRI Open House. September. Murray lab participated with demonstrations and interactive participation of the public.
- 2009 International engagement with the Instituto Antartico Chileno. April. Presented report on the field component of free–drifting icebergs as proliferating dispersion sites of iron enrichment, organic carbon production and export in the Southern Ocean. Punta Arenas, Chile.
- 2008 Palmer Station Science Lecture. August. Presented talk entitled “Seasonal Dynamics in Antarctic Marine Bacterioplankton Community Composition Reveals Adaptations to Polar Winter.” Palmer Station, Antarctica.
- 2007 Sparks Rotary. October. Presented talk entitled “Search for Life in a 3000-yr old Ice-covered Antarctic Lake”. Reno, Nevada.
- 2007 Tahoe Lake School. October. Presented talk entitled “Life in Extreme Environments”. David Gaugin’s 5th grade class. Tahoe City, California.
- 2007 Nevada K-16 Education and Engineering Programs Seminar Series. January. Presented talk entitled “Microbial Madness – Investigations into life that thrives in extreme environments”. Reno, Nevada.
- 2005 Galena High School. April. Presented talk entitled “Antarctic Microbial Ecology”. Galena, Nevada.
- 2004 Bermuda Biological Station Science Day. August. Presented talk entitled “Use of genomics technologies

to explore diversity and gene expression in Antarctic marine bacterioplankton". St. Georges, Bermuda.
2002 American Chemical Society Branch Meeting. March. Presented talk entitled "Microbes, Genomics, and the Southern Ocean".

PROFESSIONAL AFFILIATIONS

Member of ASM since 1995, ASLO since 1997, ISME since 1998, AGU since 2012, AAAS since 1999.

GRADUATE AND POSTDOCTORAL ADVISORS

Prof. James M. Tiedje, Postdoctoral advisor, Director, Center for Microbial Ecology, Michigan State University, East Lansing, Michigan.

Prof. Edward F. DeLong, Doctoral advisor, Professor of Oceanography, Co-Director C-MORE, Co-Director, SCOPE, University of Hawai'i, Manoa, Honolulu, Hawai'i.

Prof. James T. Hollibaugh, Masters advisor, (Retired) Chair, Dept. of Marine Sciences Univ. Georgia, Athens, Georgia.