

JONATHAN ZACHARY KAYE, PH.D.

EDUCATION

2003 PhD, Oceanography, University of Washington, Seattle, WA

- Subjects: deep-sea and hydrothermal vent microbial ecology, stress responses, microbial diversity, biogeochemical cycles, extremophiles, bioremediation, estuarine microbial dynamics and astrobiology.
- Motivations: investigating the microbial response to the geological heartbeat of the planet and harnessing microbial diversity and ecosystem functions to ameliorate environmental damage.

1998 MS, Oceanography, University of Washington, Seattle, WA

1995 BS, Geology–Biology, Brown University, Providence, RI

- Recognition: Magna Cum Laude, Honors and Department of Geological Sciences Senior Prize.
- Highlights: science writing fellow and awarded funds to carry out paleoclimatology research thesis.

PHILANTHROPY, STRATEGY & SCIENCE POLICY

2014 – present Program Director, Gordon and Betty Moore Foundation, Palo Alto, CA

- Responsible for ensuring high-impact science outcomes for the \$250M Marine Microbiology Initiative and \$140M Symbiosis in Aquatic Systems Initiative (SASI) grantmaking efforts. Led development of SASI and secured board approval.
- Leading science policy fellowship portfolio and diverse projects for the science program and at the intersection of the science and environmental conservation programs.
- Advancing organizational strategy and effectiveness in collaboration with fellow managers.
- Managing a staff of four to achieve initiative goals and explore new funding areas.

2007 – 2014 Program Officer, Gordon and Betty Moore Foundation, Palo Alto, CA

- Through teamwork and consultation with external advisors, identified new scientific focus for the Marine Microbiology Initiative and developed a portfolio of grantmaking strategies to advance discovery through technology and methods development and testing high-risk ideas.
- Persuaded leadership to approve \$75M in new funds and seven-year program extension.
- Identified cutting-edge research opportunities, developed and implemented program strategies, developed and managed grant proposals in close collaboration with scientists, and executed multiple international genome sequencing and gene discovery efforts and international calls for proposals.
- Partnered with science policy fellowship coalition to strengthen and expand their reach.

2005 – 2007 American Association for the Advancement of Science (AAAS) Science and Technology Policy Fellow at the US Environmental Protection Agency's National Homeland Security Research Center, Washington, DC

- Provided guidance on research investment strategies and policy to assess and understand the risks of animal and human pathogens and bioterrorism agents.
- Helped evaluate Department of Homeland Security's \$360M Biological Countermeasures portfolio.
- Educated stakeholders from coastal states on risks of animal carcass disposal in the ocean and persuaded them to reject this option.

- Led technical document production on avian and human pandemic influenza for EPA: discussions led to research aimed at closing knowledge gaps and publication of results.
- Synthesized scientific trends (including emerging infectious diseases and nanotechnology) to develop research goals and to brief senior officials on current activities and policy options.
- Guided development of terrorist and natural hazards consequence management strategies to fulfill EPA mandate.
- Invited to participate in National Science Advisory Board for Biosecurity panels to develop guidance for scientists engaged in microbial sciences research that may be misused for harmful purposes.

CONSULTING, OUTREACH & TEACHING IN U.S. AND ABROAD

2013 – present Advisory Boards

- Trustee of the Consortium for Ocean Leadership, whose aim is to advance ocean science and policy at the local and national level (2019 – present)
- Inaugural board member of the Earth-Life Consortium Foundation dedicated to ensuring open access to paleobiological databases (2018 – present)
- External Advisory Board for the National Science Foundation’s Center for Dark Energy Biosphere Investigations Science and Technology Center (C-DEBI; 2016 – 2019)
- Aquatic Virus Workshop Core Committee (2014 – 2018)
- IdeasExchange Advisory Council, Canadian Institute for Advanced Research (CIFAR): invited to advise CIFAR on bridging basic research with application and evidence-based policymaking (2015 – 2017)
- Advisor to American Society for Microbiology (ASM) for “ASM Futures” initiative: invited to advise ASM leadership and communications department on strategy and governance (2014 – 2015)
- Strategy Advisor for CIFAR’s “Life in a Changing Ocean” Exploration Area: invited to advise a team of scientists on opportunities in marine science, ecosystem modeling and ocean policy (2013 – 2014)

2013 – 2018 International Conference Steering Committees

- Aquatic Virus Workshop 7 and 8 (Plymouth, U.K., 2016 and Lincoln, Nebraska, USA 2018)
- Symposium for Aquatic Microbial Ecology 15 (Zagreb, Croatia, 2017)
- EMBO Symposium: A New Age of Discovery for Aquatic Microeukaryotes (Heidelberg, Germany, 2016)

2000, 2002 Science Consultant, American Museum of Natural History, New York, NY

- Developed educational interactive websites for youths about creatures found at deep-sea volcanoes.

1999 Graduate Teaching Assistant, Interpretation of Oceanic Data (oceanography field course), School of Oceanography, University of Washington, Seattle, WA

- Managed six-month undergraduate independent research projects, including planning, coordination, execution and analysis of oceanographic data in Puget Sound, Washington.

1997 – 1998 Science Consultant, NOVA (Public Broadcasting Service, WGBH), Boston, MA

- Aided television producers with documentary that reached an extensive public audience, propelling my desire to broaden the impact of my research activities.

RESEARCH & FIELD EXPERIENCE

2004 – 2005 **Postdoctoral Research Associate, Department of Microbiology, University of Massachusetts, Amherst, MA.** Advisor: Dr. Derek Lovley.

- Sought means to exploit bacteria to mitigate toxic metal pollution and to generate electricity.

1995 – 2003 **Graduate Research Assistant, School of Oceanography, University of Washington, Seattle, WA.** Advisor: Dr. John Baross.

1994 – 2000 **US and International Oceanographic and Geological Field Experience**

- At sea, dovetailed research strategy with objectives and constraints of fellow scientists, ships' crews and robot pilot teams, including constructing contingency plans to accommodate unanticipated events.
- Managed research plans of graduate students, technicians and teachers, leading to successful research and education experiences.
- Nine North and South Pacific cruises with ports of call in US, Canada, Chile (Easter Island) and Mexico.
- Geological field work in US Rocky Mountains, Potomac River Basin, Cyprus and Oman.
- Seven months at sea, including one dive to seafloor in the submersible *Alvin* at a depth of one mile.

SELECTED AWARDS & HONORS

2002 Outstanding Student Presentation, American Geophysical Union Fall Meeting

1999 Totem Award (Puget Sound Chapter of the Public Relations Society of America) and Communicator of Excellence Award (Washington Press Association) for "Life Down Deep: Scientists explore undersea volcanic vents" published by *ABCNews.com*

1995 National Association of Geology Teachers Award to intern at the US Geological Survey

PROFESSIONAL AFFILIATIONS

American Association for the Advancement of Science (AAAS)

American Geophysical Union (AGU)

American Society for Microbiology (ASM)

American Society of Limnology and Oceanography (ASLO)

International Society of Microbial Ecology (ISME)

International Society of Protistology (ISOP)

National Organization of Gay and Lesbian Scientists and Technical Professionals (NOGLSTP)

PUBLICATIONS

Faktorová, D., R. E. R. Nisbet, J. A. Fernández Robledo, E. Casacuberta, L. Sudek, A. E. Allen, M. Ares Jr., C. Aresté, C. Balestreri, A. C. Barbrook, P. Beardslee, S. Bender, D. S. Booth, F.-Y. Bouget, C. Bowler, S. A. Breglia, A. Broellocks, C. Brownlee, G. Burger, H. Cerutti, R. Cesaroni, M. A. Chiurillo, T. Clemente, D. B. Coles, J. L. Collier, L. Cooney, K. Coyne, R. Docampo, C. L. Dupont, V. Edgcomb, E. Einarsson, P. A. Elustondo, F. Federici, V. Freire-Beneitez, N. J. Freyria, K. Fukuda, P. A. García, P. R. Girguis, F. Gomaa, S. Gornik, J. Guo, V. Hampl, Y. Hanawa, E. R. Haro-Contreras, E. Hehenberger, A. Highfield, Y. Hirakawa, A. Hopes, C. J. Howe, I. Hu, J. Ibañez, N. A. T. Irwin, Y. Ishii, N. E. Janowicz, A. C. Jones, A. Kachale, K. Fujimura-Kamada, B. Kaur, **J. Z. Kaye**, E. Kazana, P. J. Keeling, N. King, L. A. Klobutcher, N. Lander, I.

- Lassadi, Z. Li, S. Lin, J.-C. Lozano, F. Luan, S. Maruyama, T. Matute, C. Miceli, J. Minagawa, M. Moosburner, S. R. Najle, D. Nanjappa, I. C. Nimmo, L. Noble, A. M. G. Novák Vanclová, M. Nowacki, I. Nuñez, A. Pain, A. Piersanti, S. Pucciarelli, J. Pyrih, J. S. Rest, M. Rius, D. Robertson, A. Ruaud, I. Ruiz-Trillo, M. A. Sigg, P. A. Silver, C. H. Slamovits, E. Swart, G. J. Smith, B. Sprecher, R. Stern, T. von der Haar, L. Tsy-pin, A. Turkewitz, J. Turnšek, M. Valach, V. Vergé, P. von Dassow, A. Tsaousis, R. F. Waller, L. Wang, X. Wen, G. Wheeler, A. Woods, H. Zhang, T. Mock, A. Z. Worden and J. Lukeš. 2019 (submitted). Genetic tool development in marine protists: Emerging model organisms for experimental cell biology. *Nature Methods*.
- Dheilly, N. M., J. Martínez Martínez, K. Rosario, P. J. Brindley, R. N. Fichorova, **J. Z. Kaye**, K. Kohl, L. J. Knoll, J. Lukeš, S. L. Perkins, R. Poulin, L. Schriml and L. R. Thompson. 2019. Parasite microbiome project: grand challenges. *PLOS Pathogens* 15(10): e1008028.
- Berney, C., A. Ciuprina, S. Bender, J. Brodie, V. Edgcomb, E. Kim, J. Rajan, L. Wegener Parfrey, S. Adl, S. Audic, D. Bass, D. A. Caron, G. Cochrane, L. Czech, M. Dunthorn, S. Geisen, F. O. Glöckner, F. Mahé, C. Quast, **J. Z. Kaye**, A. G. B. Simpson, A. Stamatakis, J. del Campo, P. Yilmaz and C. de Vargas. 2017. *UniEuk*: Time to Speak a Common Language in Protistology! *J. Eukaryot. Microbiol.* 64: 407–411. **Recognition from the publisher: one of the most downloaded articles in 2017 – 1,023 times.**
- Caron, D. A., H. Alexander, A. E. Allen, J. M. Archibald, E. V. Armbrust, C. Bachy, A. Bharti, C. J. Bell, S. T. Dyrhman, S. M. Guida, K. B. Heidelberg, **J. Z. Kaye**, J. Metzner, S. R. Smith and A. Z. Worden. 2017. Probing the evolution, ecology and physiology of marine protists using transcriptomics. *Nature Reviews Microbiology* 15: 6–20.
- American Academy of Microbiology with 26 co-authors. Microbes and climate change, a report on an American Academy of Microbiology and American Geophysical Union colloquium. 2016. 24pp.
- Karl, D. M. and **J. Z. Kaye**. 2014. Meeting highlights: Microbial ecology and biogeochemistry of oxygen-deficient marine waters, Santa Cruz, Chile, March 18–22, 2013. *ASLO Bulletin* 23(2): 53.
- Wright, J. and **J. Kaye**. 2013. Microbial ecology and biogeochemistry of oxygen-deficient marine waters (symposium proceedings). March 18–22, 2013, Santa Cruz, Chile. 45 pp.
- Kaye, J. Z.**, J. B. Sylvan, K. J. Edwards and J. A. Baross. 2011. *Halomonas* and *Marinobacter* ecotypes from hydrothermal vent, seafloor and deep-sea environments. *FEMS Microbiology Ecology* 75: 123–133.
- Wood, J. E., Y. W. Choi, D. J. Chappie, J. V. Rogers and **J. Z. Kaye**. 2010. Environmental persistence of a highly pathogenic avian influenza (H5N1) virus. *Environmental Science and Technology* 44: 7515–7520.
- Kaye, J. Z.** 2007. Research highlights: Animal disease and agro-terrorism. Technical briefing report, US Environmental Protection Agency, National Homeland Security Research Center.
- Kaye, J. Z.** and J. A. Baross. 2004. Synchronous effects of temperature, hydrostatic pressure and salinity on growth, phospholipid profiles and protein patterns of four *Halomonas* species isolated from deep-sea hydrothermal-vent and sea-surface environments. *Applied and Environmental Microbiology* 70: 6220–6229.
- Kaye, J. Z.**, M. C. Márquez, A. Ventosa and J. A. Baross. 2004. *Halomonas neptunia* sp. nov., *Halomonas sulfidaeris* sp. nov., *Halomonas axialensis* sp. nov., and *Halomonas hydrothermalis* sp. nov.: halophilic bacteria isolated from deep-sea hydrothermal-vent environments. *International Journal of Systematic and Evolutionary Microbiology* 54: 499–511.
- Kaye, J. Z.** 2003. Ecology, phylogeny and physiological adaptations of euryhaline and moderately halophilic bacteria from deep-sea and hydrothermal-vent environments. PhD thesis, University of Washington, Seattle, WA. 255 pp.

- Shuman, B., J. Bravo, J. A. Lynch, **J. Kaye**, P. Newby and T. Webb III. 2001. Late Quaternary water-level variations and vegetation history at Crooked Pond, southeastern Massachusetts. *Quaternary Research* 56: 401–410.
- Delaney, J. R., D. S. Kelley, E. A. Mathez, D. R. Yoerger, J. Baross, M. O. Schrenk, **J. Kaye** and V. Robergou. 2001. “Edifice Rex” sulfide recovery project: Analysis of submarine hydrothermal, microbial habitat. *EOS Transactions of the American Geophysical Union* 82(6): 67, 72–73.
- Kargel, J. S., **J. Z. Kaye**, J. W. Head III, G. M. Marion, R. Sassen, J. K. Crowley, O. P. Ballesteros, S. A. Grant and D. L. Hogenboom. 2000. Europa’s crust and ocean: origin, composition, and the prospects for life. *Icarus* 148: 226–265.
- Kaye, J. Z.** and J. A. Baross. 2000. High incidence of halotolerant bacteria in Pacific hydrothermal-vent and pelagic environments. *FEMS Microbiology Ecology* 32: 249–260.
- Kaye, J. Z.**, J. A. Huber and D. G. Gordon. 1998. Life down deep: Scientists explore undersea volcanic vents. *ABCNews.com*.
- Kaye, J. Z.** and J. Lynch. 1995. Holocene water-level fluctuations at Crooked Pond, Plymouth, Massachusetts. BS honors thesis, Brown University, Providence, RI. 104 pp.

SPOKEN AND POSTER PRESENTATIONS

- Kaye, J. Z.** 2019. Funding opportunities at the Gordon and Betty Moore Foundation, a part of the constellation of science philanthropies in the U.S. VIIIth European Congress of Protistology–International Society of Protistologists Joint meeting. Rome, Italy. (Invited)
- Kaye, J. Z.** 2019. Panelist for Consortium for Ocean Leadership’s public policy forum “U.S. Ocean Policy: Past, Present, and Future.” Washington, D.C. (Invited)
- Kaye, J. Z.** 2019. A vision for a national network. Panelist for session “Overcoming the STEM–Policy Divide with Fellowships in State Governments.” American Association for the Advancement of Science. Washington, D.C. (Invited)
- Kaye, J. Z.** 2017. Marine Microbiology Initiative: enabling discoveries about what makes the microbial ocean hum. Microbiology Society Annual Conference. Edinburgh, U.K. (Invited)
- Kaye, J. Z.** 2016. Advancing discovery in marine microbial ecology through the Moore Foundation’s Marine Microbiology Initiative. MaCuMBA conference: Marine Microbiome – Discovery & Innovation. Berlin, Germany. (Invited)
- Kaye, J. Z.** 2014. Overview of the Marine Microbial Eukaryote Transcriptome Sequencing Project. 15th International Symposium on Microbial Ecology. Seoul, South Korea. (Invited)
- Kaye, J. Z.** 2007. The persistence of avian and human influenza viruses in the environment. US Environmental Protection Agency National Homeland Security Research Center Science Conference, Louisville, KY.
- Kaye, J. Z.** 2007. Ecological and human health considerations for large-scale disposal of diseased animal carcasses and plants in the sea. US Environmental Protection Agency National Homeland Security Research Center Science Conference, Louisville, KY.
- Kaye, J. Z.** 2006. Ecological and human health considerations for large-scale disposal of diseased animal carcasses and plants in the sea. National Carcass Disposal Symposium, Beltsville, MD. (Invited)
- Lemieux, P. L., and **J. Kaye**. 2006. Environmental Protection Agency National Homeland Security Research Center research to support emergency response activities in the agricultural (Ag) sector. National Carcass Disposal Symposium, Beltsville, MD. (Invited)

- Kaye, J. Z.** 2004. Ecology of *Halomonas* from hydrothermal vents: wherefore salt-tolerant bacteria in the deep sea? Brown University Geological Sciences Department seminar, Providence, RI. (Invited)
- White, J. M., M. O. Schrenk, D. S. Kelley, J. A. Baross, **J. Z. Kaye** and J. R. Delaney. 2003. Rock-hosted hydrothermal ecosystems I: High temperature deep-sea sulfide chimneys. Geological Society of America Abstracts: 61-11, p. 150. Geological Society of America, Seattle, WA.
- Kaye, J. Z.**, and J. A. Baross. 2002. Salinity, pressure and heavy-metal stress response of moderately halophilic bacteria isolated from hydrothermal-vent environments. *EOS Transactions of the American Geophysical Union* 83(47) Fall Meeting Supplement: V72A-1283. San Francisco, CA. (Award)
- Kaye, J. Z.**, and J. A. Baross. 2002. The combined effect of salt, pressure and temperature on microbial processes and its application to extraterrestrial waters of unknown salinity. NATO Advanced Studies Institute Astrobiology Conference, Chania, Crete, Greece.
- Kargel, J. S., O. Prieto, **J. Z. Kaye**, S. Vance, G. Marion and D. L. Hogenboom. 2002. Chemical, physical, and biological environment of Europa's floating shell, ocean, and subocean crust. NASA Astrobiology Science Conference, NASA Ames Research Center, Moffet Field, CA.
- Kaye, J. Z.**, A. Ventosa and J. A. Baross. 2002. Moderately halophilic bacterial populations from deep-sea hydrothermal vents: The effect of pressure and community time-series analysis. American Geophysical Union / American Society of Limnology and Oceanography Ocean Sciences Meeting Supplement: OS31F-92. Honolulu, HI.
- Kaye, J. Z.**, and J. A. Baross. 2001. The combined effect of salt, pressure and temperature on microbial processes and its application to extraterrestrial waters of unknown salinity. University of Washington Astrobiology Conference, Crystal Mountain, WA.
- Kaye, J. Z.**, and J. A. Baross. 2001. High abundance and physiological versatility of *Halomonas* spp. in surface ocean and deep-sea, hydrothermal-vent environments. Halophiles 2001 Conference, Seville, Spain.
- Márquez, M. C., D. R. Arahal, **J. Z. Kaye**, J. A. Baross and A. Ventosa. 2000. Caracterización de *Marinobacter* sp. y *Halomonas* sp. aisladas del Océano Pacífico. III Reunión Científica de Microbiología del Medio Acuático, Santiago de Compostela, Spain.
- Kaye, J. Z.**, and J. A. Baross. 2000. Microbial adaptation to subseafloor brines in mid-ocean-ridge environments. 5th RIDGE Theoretical Institute: The Subsurface Biosphere at Mid-Ocean Ridges, Big Sky, MT.
- Kaye, J. Z.**, and J. A. Baross. 2000. Hyperthermohalophily? 7th Annual NSF Hyperthermophile Symposium, North Carolina State University, Raleigh, NC.
- Kaye, J. Z.**, and J. A. Baross. 1999. A link between halotolerant microbes and subsurface brines in the deep-sea, mid-ocean-ridge system. 6th Annual NSF Hyperthermophile Symposium, University of Georgia, Athens, GA.
- Kaye, J. Z.**, and J. A. Baross. 1999. A link between halotolerant microbes and subsurface brines in the deep-sea, mid-ocean-ridge system. RIDGE Troodos Field School, Larnaca, Cyprus.
- Kaye, J. Z.**, and J. A. Baross. 1999. Implications of halotolerant microorganisms for subsurface brines along the Juan de Fuca Ridge. RIDGE Juan de Fuca Results Symposium: A Retrospective and Planning Workshop, Seattle, WA.
- Baross, J. A., M. Summit, J. Huber, **J. Z. Kaye** and S. Roadruck. 1999. Physiological and phylogenetic diversity of subseafloor microbial communities. Geological Society of America Meeting, Denver, CO.

- Kaye, J. Z.**, and J. A. Baross. 1998. Salt-tolerant microbes isolated from hydrothermal-vent environments. *EOS Transactions of the American Geophysical Union* 79(45) Fall Meeting Supplement: 59. San Francisco, CA.
- Schrenk, M. O., **J. Z. Kaye**, J. A. Baross, D. S. Kelley and J. R. Delaney. 1998. Microbe–mineral associations in intact hydrothermal vent chimneys recovered from the Juan de Fuca Ridge, July 1998. *EOS Transactions of the American Geophysical Union* 79(45) Fall Meeting Suppl.: 59. San Francisco, CA.
- Embley, R. W., D. Butterfield, K. Roe, M. Stapp, W. W. Chadwick, L. Evans, S. Merle, J. Baross, **J. Kaye**, J. Huber, G. Massoth, J. Gendron, S. Maenner, V. Tunnicliffe, M. Tsurumi, J. Marcus, K. Juniper, D. Grelon, C. Levesque, C. Moyer, K. Pelletreau, G. Wheat, S. Scott, J. Chadwick, M. Perfit, E. Guenther, B. McLaughlin-West, J. Getsiv and E. Williamson. 1998. Time series investigations of an active volcano: The NeMO project. *EOS Transactions of the American Geophysical Union* 79(45) Fall Meeting Supplement: 921. San Francisco, CA.
- Kaye, J. Z.**, and J. A. Baross. 1998. Ecology and characterization of halotolerant and halophilic mesophiles from hydrothermal-vent environments: Implications for a warm, briny subsurface habitat. 5th Annual NSF Hyperthermophile Symposium, University of Washington, Seattle, WA.
- Kaye, J. Z.**, and J. A. Baross. 1997. In search of toxic-metal-tolerant high-temperature microbes from hydrothermal vent environments. 4th Annual NSF Hyperthermophile Symposium, Recombinant BioCatalysis Inc., Del Mar, CA.
- Kaye, J. Z.**, and J. Baross. 1997. Characterization of a novel group of chemolithoautotrophic bacteria isolated from hydrothermal-vent environments. First International Symposium on Deep-Sea Hydrothermal Vent Biology (InterRidge), Funchal, Madeira, Portugal.
- Kaye, J. Z.**, and J. A. Baross. 1997. Ecology and characterization of nine hydrothermal-vent bacterial strains isolated from the Endeavour Segment, Juan de Fuca Ridge. *EOS Transactions of the American Geophysical Union* 78(46) Fall Meeting Supplement: 740. San Francisco, CA.
- Kaye, J. Z.**, and J. A. Baross. 1996. Characterization of a novel group of metal-oxidizing chemolithoautotrophic bacteria isolated from hydrothermal vent environments. 3rd Annual NSF Hyperthermophile Symposium, North Carolina State University, Raleigh, NC.
- Newby, P., **J. Kaye** and J. Lynch. 1995. Holocene water-level fluctuations in southeastern New England. Northeast Regional Conference of the Geological Society of America, Cromwell, CT.