



Curriculum Vitae

January 08, 2020

Dr. Peter Weiss (Weiss-Penzias)

Lecturer and Associate Researcher

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RESEARCH INTERESTS

-The global mercury (Hg) biogeochemical cycle with special focus on physical and chemical processes occurring in the ocean and atmosphere that lead to methyl Hg formation in fog. -The dynamics of Hg methylation/demethylation Hg processes in river, wetland, and estuary systems. -The global cycles of nitrogen and sulfur. - Meteorology of the marine boundary layer and the free troposphere. -Source receptor studies in air pollution using back-trajectory modeling. -Using bioindicators to assess environmental pollutant loads. -Working with large environmental chemistry data sets. -Inventing and commercializing nanoparticle gas sensors for air pollution research.

TEACHING INTERESTS

Teaching and developing curriculum for classes in general inorganic and physical chemistry, environmental chemistry, analytical chemistry, chemical oceanography, environmental toxicology, atmospheric chemistry. -Implementing active learning activities into flipped classrooms and using interactive technology tools. -Obtaining classroom metrics for statistical analyses to test efficacy of teaching methods.

EMPLOYMENT HISTORY

- 1988 - 1990 Analytical Chemist, Toxscan Inc. Watsonville, California
- 1995 - 2001 Lecturer, Chemistry and Environmental Sciences at Bellevue Community College, Seattle Central Community College, Shoreline Community College, Green River Community College and the University of Washington
- 2001 - 2005 Post-Doctoral Researcher, Interdisciplinary Arts and Sciences, University of Washington, Bothell, Supervisor – Dan Jaffe
- 2006 - 2010 Research Consultant, University of Nevada, Reno, Supervisor - Mae Gustin
- 2009 - 2012 Project Scientist, Microbiology and Environmental Toxicology, University of California, Santa Cruz, Supervisor - Russ Flegal
- 2014 - 2015 Research Consultant, University of Washington, Bothell, Supervisor - Dan Jaffe
- 2013 - 2016 Associate Researcher Step 1, Microbiology and Environmental Toxicology, University of California Santa Cruz, Supervisor – Russ Flegal
- 2013 - 2016 Research Consultant, Electric Power Research Institute, Palo Alto, California, Supervisor - Arnout Ter Shure
- 2011 - 2018 Lecturer, Chemistry and Biochemistry, University of California, Santa Cruz, Supervisor – Ilan Benjamin
- Summer 2018 Faculty, COSMOS program, University of California, Santa Cruz, in the Microbiology and Environmental Toxicology Cluster. Co-teaching with Chad Saltikov
- Summer 2019 Faculty, COSMOS program, University of California, Santa Cruz, in the Microbiology and Environmental Toxicology Cluster. Co-teaching with Chad Saltikov
- 2017 - 2020 Research Associate, Moss Landing Marine Laboratory, San Jose State Foundation, Moss Landing, California, Supervisor - Wesley Heim
- 2018 - 2020 Continuing Lecturer, Chemistry and Biochemistry, University of California, Santa Cruz, Supervisor – Ilan Benjamin
- 2016 - 2021 Associate Researcher Step 2, Microbiology and Environmental Toxicology, University of California, Santa Cruz, Supervisor - Chad Saltikov
- 2020 - 2021 Lecturer, Environmental Studies Department, University of California, Santa Cruz, Supervisor - Gregory Gilbert
- 2020 - 2022 Lecturer, Earth and Planetary Sciences, University of California, Santa Cruz, Supervisor - James Zachos

EDUCATION

- 1988 B.S., with honors in Chemistry, University of California, Santa Cruz, Advisor - David Kliger, 1986 - 1988
- 1995 Ph.D., Department of Chemistry, University of Washington, Advisor - Richard Gammon, 1990 - 1995

HONORS AND AWARDS

- May 2019 Top Clean Air Leader Award in the category of Technology, Monterey Bay Air Resources District

GRANTS

- 2019 - 2021 Principal Investigator, ENVS 122 Air Pollution course development and teaching, fall quarters 2019, 2020, and 2021. Monterey Bay Air Resources District \$123,419
- 2019 - 2020 Principal Investigator, Volatile Organic Compound Sensor Development, Monterey Bay Air Resources District \$7,500
- 2019 Principal Investigator, Mercury Methylation by *Desulfovibrio Desulficans*, Koret Scholars Program \$500
- 2019 Principal Investigator, Assessing the mercury concentrations in the fur, liver and brain tissue of southern sea otters, Sea Otter Foundation Trust \$1,550
- 2019 Principal Investigator, Volatile Organic Compound Sensor Development, Launchpad Innovation Grants \$10,000
- 2018 Principal Investigator, Testing coastal Lichen species as a bioindicator of atmospheric Total Mercury and Methylmercury in Central California, Koret Scholars Program \$500
- 2018 Principal Investigator, Characterizing the process of the conversion of dimethylmercury to monomethyl mercury in fog, Koret Scholars Program \$500
- 2018 Principal Investigator, Investigating the chemistry of dimethylmercury in the environment, Undergraduate Research in Science and Technology Award \$900
- 2018 Principal Investigator, Measurement of mercury stable isotopes, Dean Paul Koch lab funds \$10,000
- Summer 2017 Principal Investigator, Methylmercury in lichen as a bioindicator of atmospheric mercury deposition from fog in Santa Cruz County, California, Gunderson Family Research Award in Coastal Sustainability \$1,500
- Fall 2013 - Summer 2017 Principal Investigator, Collaborative Research: Investigations on the Cycling of Mercury from the Ocean to Fog and Deposition to Land in Coastal California, National Science Foundation \$334,869
- Fall 2014 - Spring 2016 Principal Investigator, "Trends in Mercury Deposition", Electric Power Research Institute \$32,000
- Fall 2010 - Spring 2012 Principal Investigator, Atmospheric Mercury Monitoring Services at Elkhorn Slough, California, Environmental Protection Agency \$122,673
- Fall 2010 - Spring 2012 Principal Investigator, Investigation of Speciated Atmospheric Mercury Deposition in Fog Water at Elkhorn Slough, California, Packard Endowment for UCSC Institute of Marine Studies \$15,626
- Fall 2010 - Spring 2012 Collaborator, Evaluation of Dry Deposition and Gaseous Oxidized Mercury Using Data Collected at Three TMDL "Supersites" across Florida, Electric Power Research Institute \$16,206
- Fall 2009 - Spring 2012 Collaborator, RUI: Using GIS to Integrate the NOAA HYSPLIT Model with Surface-Based Air Quality and Mercury Deposition Data, National Science Foundation \$50,113

SCHOLARLY AND CREATIVE WORK

- 2019 Weiss-Penzias, P. S., Bank, M.S., Clifford, D. L., Torregrosa, A., Zheng, B., Lin, w., Wilmers, C. C., Marine fog inputs appear to increase methylmercury bioaccumulation in a coastal terrestrial food web, Scientific Reports
- 2019 Lyman, S. N., Cheng, I., Gratz, L. E., Weiss-Penzias, P., Zhang, L., An Updated Review of Atmospheric Mercury, Science of the Total Environment <https://doi.org/10.1016/j.scitotenv.2019.135575> PEER REVIEWED, INVITED
- 2018 Fernandez, D., Torregrosa, A., Weiss-Penzias, P., Zhang, B. J., Sorenson, D., Cohen, R., McKinley, G., Kleingartner, J., Oliphant, A., Bowman, M. Fog Water Collection Effectiveness: Mesh

- Intercomparisons, Aerosol and Air Quality Research, DOI: [10.4209/aaqr.2017.01.0040](https://doi.org/10.4209/aaqr.2017.01.0040) PEER REVIEWED
- 2018 Coale, K.H., Heim, W.A., Negrey, J., Weiss-Penzias, P., Fernandez, D., Olson, A., Chiswell, H., Byington, A., Bonnema, A., Martenuk, S., Newman, A., Beebe, C. and Till, C., The distribution and speciation of mercury in the California Current: Implications for mercury transport via fog to land. Deep Sea Research II, <https://doi.org/10.1016/j.dsr2.2018.05.012> PEER REVIEWED
- 2018 Weiss-Penzias, P., A. Sorooshian, K. Coale, W. Heim, E. Crosbie, H. Dadashazar, A. MacDonald, Z. Wang, H. Jonsson, Aircraft measurements of total mercury and monomethyl mercury in summertime marine stratus cloudwater from coastal California, USA, Environmental Science and Technology, DOI: [10.1021/acs.est.7b05395](https://doi.org/10.1021/acs.est.7b05395) PEER REVIEWED
- 2018 Peckham, M., Gustin, M.S., Weiss-Penzias, P., Weisberg, P.J. Results of a controlled field experiment to assess the use of tree tissue concentrations as bioindicators of air Hg. Biogeochemistry doi.org/10.1007/s10533-018-0533-z PEER REVIEWED
- 2017 Weiss-Penzias, P., Fernandez, D., †Moranville, R., Saltikov, C., A Low cost system for detecting fog events and triggering an active fog water collector, Aerosol and Air Quality Research, doi: [10.4209/aaqr.2016.11.0508](https://doi.org/10.4209/aaqr.2016.11.0508) († symbolizes Weiss-Penzias mentored undergraduate coauthor) PEER REVIEWED
- 2016 Weiss-Penzias, P., K. Coale, W. Heim, D. Fernandez, A. Oliphant, C. Dodge, D. Hoskins, J. Farlin, R. †Moranville, A. Olson (2016) Total and monomethylmercury and major ions in coastal California fog water: results from two years of sampling on land and at sea, Elementa-Science of the Anthropocene, doi:[10.12952/journal.elementa.000101](https://doi.org/10.12952/journal.elementa.000101) († symbolizes Weiss-Penzias mentored undergraduate coauthor) PEER REVIEWED
- 2016 Weiss-Penzias, P., D. A. Gay, M. E. Brigham, M. T. Parsons, M. S. Gustin, A. ter Schure, Trends in mercury wet deposition and mercury air concentrations across the U.S. and Canada, Science of the Total Environment, doi:[10.1016/j.scitotenv.2016.01.061](https://doi.org/10.1016/j.scitotenv.2016.01.061), 2016 PEER REVIEWED
- 2016 Zhang, J., Z Wu, I. Cheng, L.P. Wright, M.L Olson, D.A. Gay, M.R. Risch, S. Brooks, M.S. Castro, G.D. Conley, P. Weiss-Penzias The estimated six-year mercury dry deposition across North America. Environ. Sci. Technol. **2016**, 50, 12864–12873. PEER REVIEWED
- 2015 Christensen, J. N., P. Weiss-Penzias, R. ‡Fine, C. E. McDade, K. Trzepla, S. T. Brown, M. S. Gustin, Unraveling the Sources of Ground Level Ozone in the Intermountain Western United States Using Pb Isotopes, Science of the Total Environment, Volumes 530–531, 15 October 2015, Pages 519–525 doi:[10.1016/j.scitotenv.2015.04.054](https://doi.org/10.1016/j.scitotenv.2015.04.054). (‡ symbolizes graduate student co-advised by Weiss-Penzias) PEER REVIEWED
- 2015 Weiss-Penzias, P. S., H. Amos, N. Selin, M. Gustin, D. Jaffe, D. Obrist, G-R. Sheu, A. Giang, Use of global model results to understand airborne oxidized mercury observations at five high-elevation sites, Atmospheric Chemistry and Physics, 15, 1161-1173, 2015. doi:[10.5194/acp-15-1161-2015](https://doi.org/10.5194/acp-15-1161-2015) PEER REVIEWED
- 2015 Song, S., N. E. Selin, A. L. Soerensen, H. Angot, R. Artz, S. Brooks, E.-G. Brunke, G. Conley, A. Dommergue, R. Ebinghaus, T. M. Holsen, D. A. Jaffe, S. Kang, P. Kelley, W. T. Luke, O. Magand, K. Marumoto, K. A. Pfaffhuber, X. Ren, G.-R. Sheu, F. Slemr, T. Warneke, A. Weigelt, P. Weiss-Penzias, D. C. Wip, and Q. Zhang, Top-down constraints on atmospheric mercury emissions and implications for global biogeochemical cycling, Atmospheric Chemistry and Physics, 15, 5269-5325, 2015. doi:[10.5194/acp-15-7103-2015](https://doi.org/10.5194/acp-15-7103-2015) PEER REVIEWED
- 2015 †Ortiz, C., P. S. Weiss-Penzias, S. Fork, A. R. Flegal, Total and monomethylmercury in terrestrial arthropods from the central California coast, Bulletin of Environmental Contamination and Toxicology, 94:425–430, 2015. doi:[10.1007/s00128-014-1448-6](https://doi.org/10.1007/s00128-014-1448-6) († symbolizes Weiss-Penzias mentored undergraduate) PEER REVIEWED
- 2014 Jaffe, D., S. Lyman, H. Amos, M. Gustin, J. Huang, N. Selin, L. Levin, A. Ter Schure, R. Mason, R. Talbot, A. Rutter, B. Finley, L. Jaeglé, V. Shah, C. McClure, J. Ambrose, L. Gratz, S. Lindberg, P. Weiss-Penzias, G-R. Sheu, D. Feddersen, M. Horvat, A. Dastoor, A. Hynes, H. Mao, J. Sonke, F. Slemr, J. Fisher, R. Ebinghaus, Y. Zhang, G. Edwards, Progress on understanding atmospheric mercury hampered by uncertain measurements, Environmental Science and Technology, 48, 7204-7206, 2014. DOI: [10.1021/es5026432](https://doi.org/10.1021/es5026432) PEER REVIEWED
- 2013 ‡Wright, G., M. S. Gustin, P. S. Weiss-Penzias, and M. Miller, Investigation of mercury deposition and potential sources at six sites from the Pacific Coast to the Great Basin, USA, Science of the Total Environment, 470-471, 1099-1113, 2013. doi:[10.1016/j.scitotenv.2013.10.071](https://doi.org/10.1016/j.scitotenv.2013.10.071) (‡ symbolizes graduate student co-advised by Weiss-Penzias) PEER REVIEWED
- 2013 Huang, J., M. B. Miller, P. S. Weiss-Penzias, and M. S. Gustin, Comparison of reactive mercury measurements made with KCl-coated denuders, nylon membranes, and cation exchange membranes. Environmental Science and Technology, 47, 7301-7316, 2013. doi:[10.1021/es4012349](https://doi.org/10.1021/es4012349) PEER REVIEWED

- 2013 Weiss-Penzias, P. S., E. J. Williams, B. M. Lerner, T. S. Bates, C. Gaston, K. Prather, A. Vlasenko, and S. M. Li, Shipboard measurements of gaseous elemental mercury along the coast of Central and Southern California. *Journal of Geophysical Research*, 118, 208–219, doi:10.1029/2012JD018463, 2013 PEER REVIEWED
- 2012 Y. Zhang, L. Jaeglé, A. van Donkelaar, R. V. Martin, C. D. Holmes, H. M. Amos, Q. Wang, R. Talbot, R. Artz, S. Brooks, W. Luke, T. M. Holsen, D. Felton, E. K. Miller, K. D. Perry, D. Schmeltz, A. Steffen, R. Tordon, P. Weiss-Penzias, and R. Zsolway, Nested-grid simulation of mercury over North America, *Atmospheric Chemistry and Physics*, 12, 6095-6111, 2012. PEER REVIEWED
- 2012 Weiss-Penzias, P., C. †Ortiz, R. P. †Acosta, W. Heim, J. P. Ryan, D. Fernandez, J. L. Collett Jr., A. R. Flegal, Total and monomethyl mercury in fog water from the central California coast, *Geophysical Research Letters*, 39, L03804, doi:10.1029/2011GL050324, 2012. († symbolizes Weiss-Penzias mentored undergraduate coauthor) PEER REVIEWED
- 2012 Gustin, M. S., P. Weiss-Penzias, C. Peterson, Investigating sources of gaseous oxidized mercury in dry deposition at three sites across Florida, USA. *Atmospheric Chemistry & Physics*, 12(19): 9201-9219, 2012. PEER REVIEWED
- 2011 Weiss-Penzias, P., M. S. Gustin, S. N. Lyman, Sources of gaseous oxidized mercury and mercury dry deposition at two southeastern U.S. sites, *Atmospheric Environment*, 45, 4569-4579, 2011. PEER REVIEWED
- 2010 Conaway, C. H., F. J Black, P. Weiss-Penzias, M. Gault-Ringold, A. R. Flegal, Mercury speciation in Pacific coastal rainwater, Monterey Bay, California, *Atmospheric Environment*, 44, 1788-1797, 2010. PEER REVIEWED
- 2009 Weiss-Penzias, P., M. S. Gustin, S. Lyman, Observations of speciated atmospheric mercury at three sites in Nevada, USA: Evidence for a free tropospheric source of reactive gaseous mercury. *Journal of Geophysical Research*, 114, doi: 10.1029/2008JD011607, 2009. PEER REVIEWED
- 2008 Chand, D., D. A. Jaffe, P. C. Swartzendruber, E. Prestbo, W. Hafner, P. Weiss-Penzias, S. Kato, A. Takami, S. Hatakeyama, and Y. Kajii, Reactive and particulate mercury in the Asian marine boundary layer. *Atmospheric Environment*, 42, 7988–7996, 2008. PEER REVIEWED
- 2008 Ebinghaus, R., C. Banic, S. Beauchamp, D. Jaffe, H. H., Kock, N. Pirrone, L. Poissant, F. Sprovieri, and P. Weiss-Penzias, Spatial coverage and temporal trends of land-based atmospheric mercury measurements in the northern and southern hemispheres. In *Mercury Fate and Transport in the Global Atmosphere: Measurements, Models, and Policy Implications*, N. Pirrone and R. Mason Eds., United Nations Environment Program Global Mercury Partnership, 2008. PEER REVIEWED, INVITED
- 2007 Weiss-Penzias, P., D. A. Jaffe., P. S. Swartzendruber, W. Hafner, D. Chand, and E. Prestbo, Quantifying Asian and biomass burning sources of mercury using the Hg/CO ratio in pollution plumes observed at the Mount Bachelor observatory, *Atmospheric Environment*, 41, 4366-4379, 2007. PEER REVIEWED
- 2006 Weiss-Penzias, P., D. A. Jaffe., P. S. Swartzendruber, J. B. Dennison, D. Chand, W. Hafner, and E. Prestbo, Observations of Asian air pollution in the free troposphere at Mt. Bachelor Observatory during the spring of 2004. , *Journal of Geophysical Research*, 111, D10304, doi: 10.1029/2005JD006522, 2006. PEER REVIEWED
- 2006 Swartzendruber, P. S., D. A. Jaffe., E. Prestbo, P. Weiss-Penzias, N. Selin, R. Park, D. Jacob, S. Strode, and L. Jaegle, Observations of Reactive Gaseous Mercury in the Free-Troposphere at the Mt. Bachelor Observatory, *Journal of Geophysical Research*, 111, D24301, doi:10.1029/2006JD007415, 2006. PEER REVIEWED
- 2006 Weiss-Penzias, P., 2006, Teaching Environmental Sustainability through Indigenous Culture: The History of Ishi and the Yahi People of California. *International Journal of Environmental, Cultural, Economic, and Social Sustainability*, Vol. 1. PEER REVIEWED
- 2005 Jaffe, D. A., E. Prestbo, P. Swartzendruber, P. Weiss-Penzias, S. Kato, A. Takami, S. Hatakeyama, and Y. Kajii, Export of Atmospheric Mercury from Asia. *Atmospheric Environment*, 39, 3029-3038, 2005. PEER REVIEWED
- 2004 Weiss-Penzias, P., D. Jaffe, L. Jaegle, and Q. Liang, Influence of long-range-transported pollution on the annual and diurnal cycles of carbon monoxide and ozone at Cheeka Peak Observatory, *Journal of Geophysical Research*, 109, D23S14, doi:10.1029/2004JD004505, 2004. PEER REVIEWED
- 2003 Weiss-Penzias, P., D. Jaffe, A. McClintick, E. Prestbo, and M. Landis, Gaseous elemental mercury in the marine boundary layer: Evidence for rapid removal in anthropogenic pollution. *Environmental Science and Technology*, 37, 3755-3763, 2003. PEER REVIEWED
- 2003 Jaeglé, L., D. A. Jaffe, H. U. Price, P. Weiss-Penzias, P. I. Palmer, M. J. Evans, D. J. Jacob, and I. Bey, Sources and budgets for CO and O3 in the northeastern Pacific during the spring of 2001: Results from the PHOBEA-II Experiment. *Journal of Geophysical Research*, 108(D20), 8802, doi:10.1029/2002JD003121, 2003. PEER REVIEWED
- 2002 Jaffe, D. and P. Weiss-Penzias, Biogeochemical Cycles – The Nitrogen Cycle. In *Encyclopedia of Atmospheric Sciences*, J. Holton, Ed., Elsevier, 2002. INVITED

- 1995 Weiss, P. S., J. E. Johnson, R. H. Gammon, and T. S. Bates, Reevaluation of the open ocean source of carbonyl sulfide to the atmosphere. *Journal of Geophysical Research*, 100(D11), 23,083–23,092, 1995. PEER REVIEWED
- 1995 Weiss, P. S., S. S. Andrews, J. E. Johnson, and O. C. Zafiriou, Photoproduction of carbonyl sulfide in south Pacific Ocean waters as a function of irradiation wavelength, *Geophysical Research Letters*, 22(3), 215–218, 1995. PEER REVIEWED
- 1989 Milder, S. J., P. S. Weiss, D. S. Kliger, Time-resolved absorption, circular dichroism, and emission of tRNA. Evidence that the photo-cross-linking of 4-thiouridine in tRNA occurs from the triplet state. *Biochemistry*, 28(5), 2258-2264, 1989. PEER REVIEWED

PROFESSIONAL ACTIVITIES

Papers Presented at Professional Meetings

- Sep 2019 International Conference on Mercury as a Global Pollutant, Krakow, Poland. "Marine fog inputs increase methylmercury bioaccumulation in a coastal terrestrial food web" INVITED
- Dec 2018 American Geophysical Union Fall Meeting, Washington, DC. "Fog deposition of methylmercury in a coastal food web bioaccumulates to near toxic levels in an apex predator" INVITED
- Nov 2017 National Atmospheric Deposition Program Annual Meeting, San Diego, CA, "Methylmercury and total mercury in marine stratus cloud and fog water: sources, sinks and lifetimes" INVITED
- Jul 2017 International Conference on Mercury as a Global Pollutant, Providence RI. "Total mercury and monomethylmercury in marine stratus cloud water as sampled by aircraft over the Pacific Ocean along the coast of California, summer 2016" INVITED
- Dec 2016 American Geophysical Union Fall Meeting, San Francisco, CA. "Mercury speciation in terrestrial biota from coastal and inland food webs in California: A provisional model" INVITED
- Nov 2016 National Atmospheric Deposition Program Annual Meeting, Santa Fe, NM. "Temporal trends of mercury in precipitation from the Mercury Deposition Network: 2008-2015" INVITED
- Jun 2015 International Conference on Mercury as a Global Pollutant, Jeju, South Korea, "Trends of mercury wet deposition in the United States and Canada" INVITED

Conferences and Meetings

- Nov 2018 Society of Environmental Toxicology and Chemistry (SETAC) Fall Meeting in Sacramento, CA
- Oct 2017 UC STEM Faculty Learning Community Meeting
2017 Microbiology and Environmental Toxicology Department weekly Seminar.
- Jan 2016 Lilly Teaching Conference in Austin, TX
- Jun 2014 Goldschmidt Conference in Sacramento, CA

Review/Referee Grants, Proposals and Publications

- 2013 - Present Ad hoc reviewer for National Science Foundation proposals INVITED
- 2008 - Present Peer review for scientific journals: *Marine Chemistry*, *Atmospheric Chemistry and Physics*, *Science of the Total Environment*, *Journal of Geophysical Research*, *Environmental Science and Technology*, *Atmospheric Environment*, *Geophysical Research Letters*, *Deep Sea Research*, *Atmosphere*, *Elementa* INVITED
- 2019 Guest Editor for special issue in the journal *Atmosphere* titled "Atmospheric Mercury" INVITED
- May 2015 Review panel for National Science Foundation, Chemical Oceanography Program, Alexandria, Virginia INVITED

Talks and Presentations at Colleges and Universities

- Dec 2018 Leonardo Art and Science Evening Rendezvous, UC Santa Cruz INVITED
- Oct 2018 Environmental Science 10 at Cabrillo College INVITED
- Apr 2018 Environmental Science 10 at Cabrillo College INVITED
- Oct 2017 Environmental Science 10 at Cabrillo College INVITED
- Oct 2016 Environmental Science 10 at Cabrillo College INVITED

Media Appearances

Dec 2015 American Geophysical Union Fall Meeting San Francisco, CA Press conference on the science of fog INVITED

UNIVERSITY SERVICE**Service to the University**

2018 - Present Co-site representative for AFT lecturer's union

Nov 2018 Reviewer of Koret Scholarship applications (undergraduate research awards)

K-12 Outreach

2006 - Present "The Singing Scientist": Performer of music and chemistry demonstrations in libraries, schools, and community events to bring science education to the public. <https://www.facebook.com/the.earth.rangers/>
