

Miller Postdoctoral Fellow, University of California at Berkeley

Education

California Institute of Technology PhD in Geobiology	2015 – 2020
University of Southern California Graduate student, Marine Biology and Biological Oceanography	2013 – 2014
California Institute of Technology BS with Honors in Biology	2007 – 2011

Research Positions

UC Berkeley Department of Molecular and Cell Biology Miller Institute Postdoctoral Fellow, genetics/biochemistry	Berkeley, CA 2020 – present
Caltech Division of Geological and Planetary Sciences Graduate research, geobiology Research technician, geobiology	Pasadena, CA 2015 – 2020 2010 – 2013, 2014 – 2015
USC Department of Biological Sciences Graduate research, environmental microbiology	Los Angeles, CA 2013 – 2014
Caltech Division of Biology and Biological Engineering Undergraduate research, virology	Pasadena, CA 2008 – 2011
MIT Research Science Institute Summer research program, statistical mechanics	Cambridge, MA 2006
UCSC Santa Cruz Institute for Particle Physics Summer internship, particle physics	Santa Cruz, CA 2005
UCSC Santa Cruz Institute for Particle Physics COSMOS program, particle physics	Santa Cruz, CA 2004

Teaching and Professional Service

Co-chair for Gordon Research Seminar on Microbial One-Carbon Conversion from the Microscale to the Global Scale	2022
Teaching assistant for Caltech courses	2010 – 2019

Microbial Ecology, Evolution, Microbial Metabolic Diversity, Bioengineering
Bootcamp, The Great Ideas of Biology, Principles of Biology

Teaching assistant for summer professional training courses

International Geobiology Course, Caltech 2017, 2018, 2019, 2022

Microbial Diversity Course, Marine Biological Laboratory at Woods Hole 2016

Organizer

Southern California Geobiology Symposium 2016, 2019

Caltech Geoclub Seminar Series 2017 – 2018

Reviewer

Nature Microbiology, Science, Frontiers in Microbiology, Environmental
Microbiology, Communications Biology, mSystems, Limnology and Oceanography:
Methods, Elementa, Biogeosciences, NASA Astrobiology External Reviewer

Awards

2020 – 2023 Miller Research Fellowship

2017 – 2019 NIH Predoctoral Training Grant in Molecular and Cell Biology (Caltech)

2015 Gordon P. and Virginia G. Eaton Graduate Fellowship (Caltech)

2015 CEMI Fellowship (Caltech)

2013 Rose Hills Fellowship (USC)

2010 NCAA Men's Soccer Captain, First-Team All-Conference, Brine Award of Distinction

2009, 2010 Caltech Upperclass Merit Scholarship

2009 NCAA Men's Soccer Captain, Second-Team All-Conference, Brine Award of Distinction

2009 Amgen Scholars Program (Caltech)

2009 George W. and Bernice E. Green Memorial Prize (Caltech)

2008, 2010 Caltech Summer Undergraduate Research Fellowship

2008 Richard G. Brewer Prize in Physics (Caltech)

Publications

Chadwick, G. L.*, Skennerton, C. T.*, Laso-Pérez, R., Leu, A. O., Speth, D. R., Yu, H.,
... & Orphan, V. J. (2022). Comparative genomics reveals electron transfer and
syntrophic mechanisms differentiating methanotrophic and methanogenic archaea. *PLoS
biology*, 20(1), e3001508. *Authors contributed equally to this work.

Schwartzman, J. A., Ebrahimi, A., **Chadwick, G. L.**, Sato, Y., Roller, B. R., Orphan, V.
J., & Cordero, O. X. (2022). Bacterial growth in multicellular aggregates leads to the
emergence of complex life cycles. *Current Biology*.

Trutschel, L. R., **Chadwick, G. L.**, Kruger, B., Blank, J. G., Brazelton, W. J., Dart, E. R.,
& Rowe, A. R. (2022). Investigation of microbial metabolisms in an extremely high pH
marine-like terrestrial serpentinizing system: Ney Springs. *Science of The Total
Environment*, 836, 155492.

Yu, H., **Chadwick, G. L.**, Lingappa, U. F., & Leadbetter, J. R. (2022). Comparative Genomics on Cultivated and Uncultivated Freshwater and Marine “Candidatus Manganitrophaceae” Species Implies Their Worldwide Reach in Manganese Chemolithoautotrophy. *Mbio*, 13(2), e03421-21.

Yu, H., Skennerton, C. T., **Chadwick, G. L.**, Leu, A. O., Aoki, M., Tyson, G. W., & Orphan, V. J. (2022). Sulfate differentially stimulates but is not respired by diverse anaerobic methanotrophic archaea. *The ISME Journal*, 16(1), 168-177.

Brazelton, W. J., McGonigle, J. M., Motamedi, S., Pendleton, H. L., Twing, K. I., Miller, B. C., Lowe, W. J., Hoffman, A. M., Prator, C. A., **Chadwick, G. L.** ... & Lang, S. Q., (2022). Metabolic strategies shared by basement residents of the Lost City hydrothermal field. *bioRxiv*. Note: in final revision at *Applied and Environmental Microbiology*.

Jiménez Otero, F., **Chadwick, G. L.**, ... & Bond, D. R. (2021). Evidence of a streamlined extracellular electron transfer pathway from biofilm structure, metabolic stratification, and long-range electron transfer parameters. *Applied and environmental microbiology*, 87(17), e00706-21.

Lingappa, U.F., Yeager, C.M., Sharma, A., Lanza, N.L., Morales, D.P., Xie, G., Atencio, A.D., **Chadwick, G.L.**, ... & Fischer, W. W. (2021). An ecophysiological explanation for manganese enrichment in rock varnish. *Proceedings of the National Academy of Sciences*, 118(25), p.e2025188118.

He, X., **Chadwick, G. L.**, Kempes, C. P., Orphan, V. J., & Meile, C. (2021). Controls on interspecies electron transport and size limitation of anaerobically methane-oxidizing microbial consortia. *Mbio*, 12(3), e03620-20.

He, X., **Chadwick, G. L.**, Jiménez Otero, F., Orphan, V., & Meile, C. (2021). Spatially Resolved Electron Transport through Anode-Respiring *Geobacter sulfurreducens* Biofilms: Controls and Constraints. *ChemElectroChem*, 8(10), 1747-1758.

Mickol, R.L., Louyakis, A.S., Kee, H.L., Johnson, L.K., Dawson, S.C., Hargreaves, K.R., **Chadwick, G.L.**, Newman, D.K., Leadbetter, J.R. and Brown, C.T., (2021). Draft Genome Sequence of the Free-Living, Iridescent Bacterium *Tenacibaculum mesophilum* Strain ECR. *Microbiology resource announcements*, 10(1), pp.e01302-20.

Chadwick, G. L.*, Otero, F. J.*, Gralnick, J. A., Bond, D. R., & Orphan, V. J. (2019). NanoSIMS imaging reveals metabolic stratification within current-producing biofilms. *PNAS*, 201912498. *Authors contributed equally to this work.

Bublitz, D. C., **Chadwick, G. L.**, Magyar, J. S., Sandoz, K. M., Brooks, D., Mesnage, S., Ladinsky, M. S., Garber, A. I., Bjorkman, P. J., Orphan, V. J., McCutcheon, J. P. (2019). Peptidoglycan production by an insect-bacterial mosaic. *Cell*, 179:j.cell.2019.08.054.

He, X., **Chadwick, G.**, Kempes, C., Shi, Y., McGlynn, S., Orphan, V., & Meile, C. (2019). Microbial interactions in the anaerobic oxidation of methane: model simulations constrained by process rates and activity patterns. *Environmental microbiology*, 21(2), 631-647.

Boyd, J.A., Jungbluth, S.P., Leu, A.O., Evans, P.N., Woodcroft, B.J., **Chadwick, G.L.**, Orphan, V.J., Amend, J.P., Rappé, M.S. and Tyson, G.W. (2019). Divergent methyl-coenzyme M reductase genes in a deep-subseafloor Archaeoglobi. *The ISME journal*, 13(5), 1269.

Bird, L. R., Dawson, K. S., **Chadwick, G. L.**, Fulton, J. M., Orphan, V. J., & Freeman, K. H. (2019). Carbon isotopic heterogeneity of coenzyme F430 and membrane lipids in methane-oxidizing archaea. *Geobiology*.

Chadwick, G. L., Hemp, J., Fischer, W. W., & Orphan, V. J. (2018). Convergent evolution of unusual complex I homologs with increased proton pumping capacity: energetic and ecological implications. *The ISME journal*, 12(11), 2668.

Dekas, A.E., Fike, D.A., **Chadwick, G.L.**, Green-Saxena, A., Fortney, J., Connon, S.A., Dawson, K.S. and Orphan, V.J. (2018). Widespread nitrogen fixation in sediments from diverse deep-sea sites of elevated carbon loading. *Environmental microbiology*, 20(12), 4281-4296.

McGlynn, S.E., **Chadwick, G.L.**, O'Neill, A., Mackey, M., Thor, A., Deerinck, T.J., Ellisman, M.H. and Orphan, V.J. (2018). Subgroup characteristics of marine methane-oxidizing ANME-2 archaea and their syntrophic partners as revealed by integrated multimodal analytical microscopy. *Appl. Environ. Microbiol.*, 84(11), e00399-18.

Scheller, S., Yu, H., **Chadwick, G. L.**, McGlynn, S. E., & Orphan, V. J. (2016). Artificial electron acceptors decouple archaeal methane oxidation from sulfate reduction. *Science*, 351(6274), 703-707.

Dekas, A. E., Connon, S. A., **Chadwick, G. L.**, Trembath-Reichert, E., & Orphan, V. J. (2016). Activity and interactions of methane seep microorganisms assessed by parallel transcription and FISH-NanoSIMS analyses. *The ISME journal*, 10(3), 678-692.

McGlynn, S. E. *, **Chadwick, G. L. ***, Kempes, C. P., & Orphan, V. J. (2015). Single cell activity reveals direct electron transfer in methanotrophic consortia. *Nature*, 526(7574), 531-535. *Authors contributed equally to this work.

Evans, P. N., Parks, D. H., **Chadwick, G. L.**, Robbins, S. J., Orphan, V. J., Golding, S. D., & Tyson, G. W. (2015). Methane metabolism in the archaeal phylum Bathyarchaeota revealed by genome-centric metagenomics. *Science*, 350(6259), 434-438.

Tavormina, P. L., Hatzepichler, R., McGlynn, S., **Chadwick, G.**, Dawson, K. S., Connon, S. A., & Orphan, V. J. (2015). *Methyloprofundus sedimenti* gen. nov., sp. nov.,

an obligate methanotroph from ocean sediment belonging to the 'deep sea-1' clade of marine methanotrophs. *International journal of systematic and evolutionary microbiology*, 65(1), 251-259.

Dekas, A. E., **Chadwick, G. L.**, Bowles, M. W., Joye, S. B., & Orphan, V. J. (2014). Spatial distribution of nitrogen fixation in methane seep sediment and the role of the ANME archaea. *Environmental microbiology*, 16(10), 3012-3029.

Levin, L. A., *et al.* (2012) A hydrothermal seep on the Costa Rica margin: middle ground in a continuum of reducing ecosystems. *Proceedings of the Royal Society B: Biological Sciences* 279.1738 (2012): 2580-2588.

Presentations

Chadwick, G.L. (2022). Using nanoSIMS to answer interesting spatial questions. (Talk) **International Geobiology Course 2022**. Mammoth Lakes, CA

Chadwick, G.L. (2021). Genomic determinants of reverse methanogenesis in archaea. (Talk) **Integrative Genomics Institute Seminar Series**. Virtual.

Chadwick, G.L. (2021). Physiological and transcriptional response to the repression of methanogenesis in a methanogen. (Talk) **West Coast Bacterial Physiologists**. Virtual.

Chadwick, G.L. (2020). Genomic determinants of reverse methanogenesis in archaea. (Talk) **Molecular and Cell Biology Department - Genetics, Genomics & Development retreat**. Virtual.

Chadwick, G.L. (2020). How to anaerobically oxidize hydrocarbons: lessons from hydrothermal (and cold) marine sediments. (Invited Talk) **Thermal Biology Institute Seminar Series, MSU**. Virtual.

Chadwick, G.L. (2020). Cell to Ecosystem: Understanding methane and associated nutrient cycling by sediment-hosted syntrophic consortia and their viral predators. (Invited Talk) **DOE-BER 2020 Genomic Sciences Program Annual PI Meeting**. Arlington, Virginia.

Chadwick, G.L. (2019). Ultrafast swimming in a novel genus of purple sulfur bacteria. (Talk) **West Coast Bacterial Physiologists**. Pacific Palisades, California

Chadwick, G. L. (2019). Methanotrophy: looking backward. (Invited Talk) **COST Action CA17120 Chemobrionics 30/80 Meeting**. Granada, Spain.

Chadwick, G. L., Jiménez-Otero, F., Deerinck, T., He, X., Skennerton, C. T., Meile, C., Ellisman, M., Bond, D. R., Orphan, V. J. (2018). Implications of spatial structure in methanotrophic ANME-SRB consortia. (Poster) **Molecular Basis of Microbial One-Carbon Metabolism, Gordon Research Conference**. Sunday River, Maine.

Chadwick, G. L., Hemp, J., Fischer, W. W., & Orphan, V. J. (2017). Predicting the function of novel of complex I homologs from poorly studied and uncultured organisms: hints from primary sequences, crystal structures and phylogenies. (Poster) **NeLLi 2017: From New Lineages of Life To New Functions**. Walnut Creek, California.

Chadwick, G. L., Jiménez-Otero, F., Gralnick, J. A., Bond, D. R., Orphan, V. J. (2017). Geobacter activity in electrode biofilms is spatially dependent. (Poster) **ISMET6 International Society for Microbial Electrochemistry and Technology Meeting**. Lisbon, Portugal.

Chadwick, G. L., Hemp, J., Fischer, W. W., & Orphan, V. J. (2017). Convergent evolution of respiratory complex I homologs with additional proton pumping capacity. (Seminar series talk) **MicroMorning**, Caltech.

Chadwick, G. L. and Orphan, V. J. (2015). Genomic insights into the biochemistry and bioenergetics of anaerobic methanotrophic archaea. (Poster) **Archaea: Ecology, Metabolism & Molecular Biology, Gordon Research Conference**. Sunday River, Maine.

Chadwick, G. L., Dekas, A. E., Connon, S. A., and Orphan, V. J. (2011). Investigations into ammonium dependent shut off of nitrogen fixation in methane seep sediments from Hydrate Ridge North. (Poster) **Southern California Geobiology Symposium, USC**.

References

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