Caitlin M. Gionfriddo, Ph.D.

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EDUCATION

Ph.D. in Science, The University of Melbourne, Australia **2017**
Thesis: Biogeochemical mercury cycling in sea ice and geothermal springs
Disciplinary focus in microbial ecology, genomics, environmental chemistry, geochemistry

M.Sci. (Distinction) in Earth Sciences, The University of Melbourne, Australia **2012**

B.Sci. in Chemistry (with Honors), University of South Carolina, United States **2010**

PROFESSIONAL APPOINTMENTS

La Trobe University Albury-Wodonga, VIC
01/2023–present Research Fellow, Department of Environment and Genetics

Smithsonian Environmental Research Center Edgewater, MD, USA
09/2020–12/2022 Biologist, Robert and Arlene Kogod Secretarial Scholar

Oak Ridge National Laboratory, Biosciences Division Oak Ridge, TN, USA
08/2017–09/2020 Postdoctoral Research Associate

GRANTS AND FELLOWSHIPS

Smithsonian Institution, Secretary's Scholar Program 2020-2022
Geochemical drivers of microbial community dynamics and net methylmercury production in freshwater and brackish tidal marshes (Fellow, AU$202,355)

Environmental Molecular Sciences Laboratory User Proposal 2018-2019
A systems biology approach to identifying the native function of Hg methylation proteins in *Desulfovibrio desulfuricans* ND132 (Co-Investigator, AU$87,000)

PUBLICATIONS (17 peer-reviewed journal articles, 4 published datasets)

Peer-Reviewed Journal Articles (*contributed equally, #student co-author)

2023 **Gionfriddo, C.M.**, A.B. Soren, A.M. Wymore, D.S. Hartnett, M. Podar, J.M. Parks, D.A. Elias, C.C. Gilmour. Transcriptional control of *hgcAB* by an ArsR-like regulator in *Pseudodesulfovibrio mercurii* ND132. *Applied and Environmental Microbiology*, e01768-22.

2023 Capo, E., B.D. Peterson, M. Kim, D.S. Jones, S.G. Acinas, M. Amyot, ... **C.M. Gionfriddo**. A consensus protocol for the recovery of mercury methylation genes from metagenomes. *Molecular Ecology Resources*, *23*(1).

2022 Pierce, C.E.#, O.S. Furman, S.L. Nicholas, J.C. Wasik, **C.M. Gionfriddo**, A.M. Wymore, S.D. Sebestyen, R.K. Kolka, C.P. Mitchell, N.A. Griffiths, D.A. Elias, E.A. Nater, B.M. Toner. Role of Ester Sulfate and Organic Disulfide in Mercury Methylation in Peatland Soils. *Environmental Science & Technology*.

2021 Kim, M., R.L. Wilpiszeski, M. Wells, A.M. Wymore, **C.M. Gionfriddo**, S.C. Brooks, M. Podar, D.A. Elias, Metagenome-Assembled Genome Sequences of Novel Prokaryotic Species from the Mercury-Contaminated East Fork Poplar Creek, Oak Ridge, Tennessee, USA. *Microbiology Resource Announcements*, *10*(17).

2021 Schofield R., S. Utembe, **C.M. Gionfriddo**, M. T. Tate, D. P. Krabbenhoft, S. Adeloju, M. Dundek, M. Keywood, R. Dargaville, M. Sandiford, Atmospheric mercury in the LaTrobe Valley, Australia: case study June 2013. *Elementa: Science of the Anthropocene*

2021 Gilmour C. C., A.B. Soren, **C.M. Gionfriddo**, M. Podar, J. D. Wall, S. D. Brown, J. K. Michener, M. S. G. Urriza, D. A. Elias, Pseudodesulfovibrio mercurii sp. nov., a mercury-methylating bacterium isolated from sediment. *International Journal of Systematic and Evolutionary Microbiology*, 004697.

2021 Lin H., D.B. Ascher, Y. Myung, C.H. Lamborg, SJ. Hallam, **C.M. Gionfriddo**, K.E. Holt, J.W. Moreau, Mercury methylation by metabolically versatile and cosmopolitan marine bacteria. *The ISME journal*, 1-16.

2021 Carrell A.A., G.E. Schwartz, M. Cregger, **C. M. Gionfriddo**, D.A. Elias, R.L. Wilpiszeski, D.M. Klingeman, A.M. Wymore, K.A. Muller, S. Brooks, Nutrient exposure alters microbial composition, structure, and mercury methylating activity in periphyton in a contaminated watershed. *Frontiers in Microbiology*, *12*(543).

2020 **Gionfriddo C.M.**, A.M. Wymore, D.S. Jones, R.L. Wilpiszeski, M.M. Lynes, G.A. Christensen, A. Soren, C.C. Gilmour, M. Podar, D.A. Elias, An improved hgcAB primer set and direct high-throughput sequencing expand Hg-methylator diversity in nature. *Frontiers in Microbiology*, *11*(2275).

2020 Wilpiszeski R.L.*, **CM. Gionfriddo***, A.M. Wymore, J.W. Moon, K.A. Lowe, M. Podar, S.A. Rafie, M.W. Fields, T.C. Hazen, X. Ge, F. Poole, M.W. Adams, R. Chakraborty, Y. Fan, J. D. V. Nostrand, J. Zhou, A. P. Arkin, D. A. Elias, In-field bioreactors demonstrate dynamic shifts in microbial communities in response to geochemical perturbations. *PloS one*, *15*(9).

2020 **Gionfriddo C.M.**, M.B. Stott, J.F. Power, J.M. Ogorek, D.P. Krabbenhoft, R.R. Wick, K.E. Holt, L.-X Chen, B.C. Thomas, J.F. Banfield, J.W. Moreau, Genome-resolved metagenomics and detailed geochemical speciation analyses yield new insights into microbial mercury cycling in geothermal springs. *Applied and Environmental Microbiology, 86*(15).

2019 Christensen G.A., **C.M. Gionfriddo**, A.J. King, J.G. Moberly, C.L. Miller, A.C. Somenahally, S.J. Callister, H. Brewer, M. Podar, S.D. Brown, A.V. Palumbo, C.C. Brandt, A.M. Wymore, S.C. Brooks, C. Hwang, M.W. Fields, J.D. Wall, C.C. Gilmour, D.A. Elias, Determining the reliability of measuring mercury cycling gene abundance with correlations with mercury and methylmercury concentrations. *Environmental Science & Technology, 53*(15).

2018 Ndu U., G.A. Christensen, N.A Rivera, **C.M. Gionfriddo**, M.A. Deshusses, D.A. Elias, H. Hsu-Kim, Quantification of mercury bioavailability for methylation using diffusive gradient in thin-film samplers. *Environmental Science & Technology*, *52*(15).

2016 **Gionfriddo C.M.**, M.T. Tate, R.R. Wick, M.B. Schultz, A. Zemla, M.P. Thelen, R. Schofield, D.P. Krabbenhoft, K.E. Holt, J.W. Moreau, Microbial mercury methylation in Antarctic sea ice. *Nature Microbiology*, *1*, 16127.

2015 **Gionfriddo C.M.**, J. Ogorek, M. Butcher, D.P. Krabbenhoft, and J.W. Moreau, Mercury distribution and mobility at the abandoned Puhipuhi mercury mine, Northland, New Zealand, *New Zealand Journal of Geology and Geophysics*, *58*(1).

2015 Moreau J.W., **C.M. Gionfriddo**, D.P. Krabbenhoft, J.M. Ogorek, J.F. DeWild, G.R. Aiken, E.E. Roden, The effect of natural organic matter on mercury methylation by Desulfobulbus propionicus 1pr3, *Frontiers in Microbiology*, *6*.

2015 Humphries R., R. Schofield, M. Keywood, J. Ward, J. Pierce, **C.M. Gionfriddo**, M. Tate, D. Krabbenhoft, I. Galbally, S. Molloy, Boundary layer new particle formation over East Antarctic sea ice–Possible Hg driven nucleation? *Atmospheric Chemistry and Physics*, *15*(23).

Published Datasets

2021 **Gionfriddo C.M.**, E. Capo, B. Peterson, H. Lin, D. Jones, A.G. Bravo, S. Bertilsson, J. Moreau, K. McMahon, D. Elias, C. Gilmour, Hg-MATE-Db.v1.01142021. The Smithsonian Institution. Dataset. doi:10.25573/serc.13105370.v1

2019 **Gionfriddo C.M.**, M. Podar, C. Gilmour, E. Pierce, D. Elias, ORNL Compiled Mercury Methylator Database. DOE Data Explorer. United States. doi:10.12769/1569274.

2013 **Gionfriddo C.M.**, M. Tate, D.P. Krabbenhoft, J.W. Moreau, R. Schofield, Total and Methylmercury Analysis of Sea Ice, Seawater, Snow, and Brine Samples Collected During the SIPEX II Voyage of the Aurora Australis, 2012. Australian Antarctic Data Centre. doi:10.4225/15/53266BC2BC486

2013 **Gionfriddo C.M.**, M. Tate, D.P. Krabbenhoft, J.W. Moreau, R. Schofield, Gaseous elemental mercury measurements of boundary layer air made by a Tekran 2537 during the SIPEX II voyage of the Aurora Australis, 2012, Australian Antarctic Data Centre. doi:10.4225/15/53266BDA687FC

RECENT CONFERENCE ACTIVITY

Podium Presentations (of 7 total)

2022 **C.M. Gionfriddo,** A.B. Soren, D.S. Hartnett, A.M. Wymore, D.A. Elias, C.C. Gilmour. Linking Metabolic and *hgcA* Activity to Mercury Methylation Rates by *Pseudodesulfovibrio mercurii* ND132. Oral, ICMGP, Virtual. July 24-29

2020 **C.M. Gionfriddo**, A.M. Wymore, R.L. Wilpiszeski, Schwartz, G.E., C.C. Gilmour, D.A. Elias. Resolving the molecular mechanisms essential to expression of hgcA by mercury methylators. Goldschmidt Conference, Virtual. June 21–26

2018 C.M. Gionfriddo, J.W. Moon, A.M. Wymore, M. Podar, C.C. Brandt, J.D. Wall, C.C. Gilmour, R. Wilpiszeski, D.A. Elias. (Keynote) A systems biology approach to identifying the native function of Hg methylation proteins in D. desulfuricans ND132. Goldschmidt Conference, Boston, MA. August 12–17

2019 **C.M. Gionfriddo**, A.M. Wymore, M. Podar, C.C. Brandt, J.D. Wall, C.C. Gilmour, R.L. Wilpiszeski, D.A. Elias. A multi-omics view of the native biochemical function of Hg methylation proteins in Desulfovibrio desulfuricans ND132. ICMGP, Krakow, Poland. September 8–13

2015 **C.M. Gionfriddo**, D.P. Krabbenhoft, M. Stott, R. R. Wick, M. Schultz, K. Holt, J.W. Moreau. "Mercury Methylation and Detoxification by Novel Microorganisms in Mercury Enriched Mesothermal Springs." AGU Fall Meeting, San Francisco, USA. December 14–18

2015 **C.M. Gionfriddo**, M. Tate, D.P. Krabbenhoft, R. R. Wick, M. Schultz, K.E. Holt, R. Schofield, J.W. Moreau. **"**Metagenomic evidence for biotic mercury transformations in Antarctic sea ice." ICMGP, Jeju, South Korea. June 14–19

Poster Presentations (of 9 total)

2019 C.M. Gionfriddo, J. Michener, A.M. Wymore, M. Podar, C.C. Brandt, J.D. Wall, C.C. Gilmour, R. Wilpiszeski, D.A. Elias. A multi-pronged approach to identifying the biochemical function of Hg methylation proteins in *Desulfovibrio desulfuricans* ND132. ESS PI meeting, Washington, DC. April 30

2018 C.M. Gionfriddo, G.A. Christensen, A.M. Wymore, M. Podar, A.V. Palumbo, C.C. Brandt, R. Harvey, A. Soren, C.C. Gilmour, J.D. Wall, D.A. Elias. Molecular, Genomic, Physiological Studies of Mercury Methylation. ESS PI Meeting, Washington, DC. May 1–2

2017 C.M. Gionfriddo, M. Schultz, K. Holt, J.W. Moreau. Microbial Mercury Cycling in the East Antarctic Sea-Ice Environment. AusME Conference, Melbourne, Australia. February 13–15

AWARDS

2023 SABE Staff Conference Travel Grant, La Trobe University (AU$2000)
2016 Albert Shimmins Award, The University of Melbourne (AU$3000)
2015 Royal Society of Victoria Young Scientist Research Prize, Earth Sciences (Finalist)
2015 Silver Award Student Presentation, International Conference on Mercury as a Global Pollutant
2015 The University of Melbourne Faculty of Science Travelling Scholarship (AU$1000)
2015 Travel Grant, Victorian Life Sciences (VLSCI) (AU$500)
2015 Travel Grant, ICMGP (AU$760)
2013 Baragwanath Geology Research Scholarship, The University of Melbourne (AU$1000)
2013 Geology Research Scholarship Victoria, Geological Society of Australia (AU$500)
2011 CM Tattam Scholarship, The University of Melbourne (AU$1000)
2011 Student Travel Grant, American Geophysical Union (AGU) (AU$1400)

RESEARCH AND INDUSTRY EXPERIENCE

The University of Melbourne, School of Earth Sciences Melbourne, Australia
03/2013–08/2017 Graduate Research Assistant and Course Demonstrator

The University of Melbourne, School of Earth Sciences Melbourne, Australia
09/2012–03/2013 Mercury Research Assistant

CH2M HILL London, UK
06/2009–08/2009 Environmental Services Intern

TEACHING EXPERIENCE

Hydrogeology and Environmental Geochemistry
School of Earth Sciences, The University of Melbourne, Australia
2017 Semester 1 Sessional Lecturer (Instructor of Record)
2011–2015 Semester 1 Demonstrator/Teaching Assistant

Geomicrobiology and Biogeochemistry
School of Earth Sciences, The University of Melbourne, Australia
2016 Semester 1 Demonstrator/Teaching Assistant

Advanced Field Mapping
School of Earth Sciences, The University of Melbourne, Australia
2013 2-Week Field Camp Demonstrator/Field Hand

SERVICE AND OUTREACH

Conference Activity
Session Chair, Joint Conference ICOBTE & ICHMET, Wuppertal Germany, 6-10 September 2023
Session Chair, ICMGP, Virtual, 24-29 July 2022
Conference Convener, 26th Victorian Universities Earth and Environmental Science Conference, 2013

Committee member
2021-2022 Smithsonian Environmental Research Center Women in Science Committee
2021-2022 Smithsonian Environmental Research Center Science & Coffee Seminar Series, Co-Chair
2016 Royal Society of Victoria Outreach Committee
2014-2015 University of Melbourne, School of Earth Sciences Staff-Student Liaison Committee
2013-2015 University of Melbourne Earth Sciences Postgrad Group Committee

Student mentoring
Jada Damond, University of Maryland Baltimore, PhD student
Caroline Pierce, University of Minnesota, PhD student
Natalia Neal-Walthall, Duke University, PhD student (Completed 2022)
Sydne Ashford, Wellesley College, Undergraduate intern at ORNL (2019)

Technical expertise reviewer
French National Research Agency AAPG Generic Proposal Call
New Hampshire Sea Grant

Media Coverage
2016 "Biogeochemistry: Mercury methylation on ice" by Elsie M. Sutherland and Amina T. Schartup, Nature Microbiology
2016 "Hiding in plain sight" by Alana Schetzer, Pursuit, The University of Melbourne
2016 "Toxic levels of mercury found in Antarctic sea ice" by Tim Lamacraft, ABC News Radio PM

TECHNICAL SKILLS

- **Microbiology:** molecular methods (DNA/RNA, PCR/qPCR, FISH) aerobic/anaerobic culturing (batch, chemostats, bioreactors), sequencing (Sanger, NGS metagenomics, RNAseq), metabolomics (GC-MS), proteomics (MS-MS), bioinformatic tools and statistics (R)
- **Analytical chemistry**: trace metal (ICP-MS, ICP-AES), total mercury and methylmercury analysis (CVAAS, GC-ICP-MS), ion and gas chromatography, geochemical modelling (ChemEQL)

INVITED TALKS

2022 Mersorcium Virtual Seminar Series. February 24
"A multi-omics approach to linking microbial community dynamics to mercury biogeochemistry"

2020 New Mexico Institute of Mining and Technology. Biology Department Seminar, January 13
"A multi-omics approach to linking microbial community dynamics to mercury biogeochemistry"

2015 Royal Society of Victoria. Very Young Scientist Night Outreach Event, November 26
"Microbes in Antarctic sea ice."

2015 Royal Society of Victoria. Young Scientist Awards Night, September 24
"How Antarctic sea-ice microbial communities transform mercury: implications for methylmercury bioaccumulation in marine food webs"

2014 Geological Society of Australia, Victoria Division. Student Night, July 31
"Antarctic sea ice: A source of methylmercury in the Southern Ocean?"

REFERENCES

Cynthia C. Gilmour
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Principal Investigator, Senior Scientist
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Edgewater, Maryland 21037
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Ph.D. Thesis Advisor
Reader in Geomicrobiology
School of Geographical & Earth Sciences
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