

Anirban Chakraborty

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**Idaho State
University**

Research Interests

Subsurface geomicrobiology, extremophiles, marine sediment microbiome, groundwater microbiome, biogeography, microbial organotrophy, hydrocarbon seepage, deep biosphere, microbe-mineral interactions, redox reactions

Employment

- 12/2021 - present **Assistant Professor**, Department of Biological Sciences, Idaho State University, Pocatello, ID, USA.
- 12/2018 - 11/2021 **Research Associate:** "Microbial ecology of marine hydrocarbon seeps"
Advisor: Dr. Casey Hubert
Department of Biological Sciences, University of Calgary, Calgary, AB, Canada.
- 06/2014 - 11/2018 **Postdoctoral Research Associate:** "Microbial ecology of marine hydrocarbon seeps"
Advisor: Dr. Casey Hubert
Department of Biological Sciences, University of Calgary, Calgary, AB, Canada.
- 01/2013 - 05/2014 **Postdoctoral Fellow:** "Microbiology of arsenic-contaminated aquifers"
Advisor: Dr. Chanchal DasGupta
Department of Life Science & Biotechnology, Jadavpur University, Kolkata, WB, India.
- 08/2009 - 12/2012 **Associate Instructor**, O'Neill School of Public and Environmental Affairs, Indiana University Bloomington, Bloomington, IN, USA
- 08/2007 - 07/2009 **Teaching Assistant**, O'Neill School of Public and Environmental Affairs, Indiana University Bloomington, Bloomington, IN, USA

Education

- 2007 - 2012 **Ph.D.**, Environmental Science, Indiana University Bloomington, Bloomington, IN, USA
Dissertation title: Microbiology and biogeochemistry of nitrate-dependent Fe(II) oxidation: bacterial growth and physiology
Advisor: Dr. Flynn Picardal
- 2004 - 2006 **M.Sc.**, Environment Management, Forest Research Institute, Dehra Dun, India
- 2001 - 2004 **B.Sc.**, Zoology (Hons.), Chemistry (minor), Botany (minor), University of Calcutta, Kolkata, India

Publications

Peer-reviewed articles (n = 16; >450 citations; h-index = 9; *corresponding author; §student co-author)

16. **Chakraborty***, A., M. Suchy, C.R.J. Hubert and M.C. Ryan*. (2022). Vertical stratification of microbial communities and isotope geochemistry tie groundwater denitrification to sampling location within a nitrate-contaminated aquifer. *Science of the Total Environment* <https://doi.org/10.1016/j.scitotenv.2022.153092>.
15. Khot, V., J. Zorz, D.A. Gittins, **A. Chakraborty**, E. Bell, M.A. Bautista, A.J. Paquette, A.K. Hawley, B. Novotnik, C.R.J. Hubert, M. Strous and S. Bhatnagar*. (2022). CANT-HYD: A curated database of phylogeny-derived Hidden Markov Models for annotation of marker genes involved in hydrocarbon degradation. *Frontiers in Microbiology* 12:764058.
14. Gittins*, D.A., P.A. Desiage, N. Morrison, J.E. Rattray, S. Bhatnagar, **A. Chakraborty**, J. Zorz, C. Li, O. Horanszky§, M.A. Cramm, J. webb, A. MacDonald, D.C. Campbell and C.R.J. Hubert. (2021). Geological processes mediate a subsurface microbial loop in the deep biosphere. *bioRxiv* <https://doi.org/10.1101/2021.10.26.465990>.
13. Rattray*, J.E., **A. Chakraborty**, C. Li, G. Elizondo§, N. John§, M. Wong§, J.R. Radović, T.B.P. Oldenburg and C.R.J. Hubert. (2021). Sensitive quantification of dipicolinic acid from bacterial endospores in soils and sediments. *Environmental Microbiology* 23:1397-1406.
12. Cramm*, M.A., B. de Moura Neves, C.C.M. Manning, T.B.P. Oldenburg, P. Archambault, **A. Chakraborty**, A. Cyr-Parent et al. (2021). Characterization of marine microbial communities around an Arctic seabed hydrocarbon seep at Scott Inlet, Baffin Bay. *Science of the Total Environment* 762:143961.
11. Dong*, X., J.E. Rattray, D.C. Campbell, J. Webb, **A. Chakraborty**, O. Adebayo, S. Matthews§, C. Li, M. Fowler, N.M. Morrison, A. MacDonald, R.A. Groves, I.A. Lewis, S.H. Wang§, D. Mayumi, C. Greening and C.R.J. Hubert*. (2020). Thermogenic hydrocarbon biodegradation by diverse depth-stratified microbial populations at a Scotian Basin cold seep. *Nature Communications* 11:5825.
10. **Chakraborty***, A., S.E. Ruff, X. Dong, C. Li, E.D. Ellefson§, J.M. Brooks, J. McBee, B.B. Bernard and C.R.J. Hubert*. (2020). Hydrocarbon seepage in the deep seabed links subsurface and seafloor biospheres. *Proceedings of the National Academy of Sciences USA* 117:11029-11037.
Media coverage of the article:
Science Daily: <https://www.sciencedaily.com/releases/2020/05/200501184314.htm>
Phys. Org: <https://phys.org/news/2020-05-window-world-life-seafloor-petroleum.html>
Oceanbites: <https://oceanbites.org/oil-and-gas-seeps-microbial-elevators-through-ocean-sediments/>
SciTechDaily: <https://scitechdaily.com/deep-biosphere-microbes-life-is-bubbling-up-from-sediments-deep-below-the-ocean-floor/>
Ucalgary News: <https://www.ucalgary.ca/news/naturally-occurring-oil-and-gas-seeps-act-elevators-microbial-life-earths-deep-sedimentary-layers>
MBL News: <https://www.mbl.edu/blog/window-to-another-world-team-finds-life-bubbling-up-to-the-seafloor-with-petroleum-from-deep-below/>
9. Ferguson, D.K., C. Li, C. Jiyang, **A. Chakraborty**, S.E. Grasby and C.R.J. Hubert*. (2020). Natural attenuation of spilled crude oil by cold-adapted soil bacterial communities at a decommissioned High Arctic oil well site. *Science of the Total Environment* 722:137258.
8. **Chakraborty**, A., C.K. DasGupta and P. Bhadury*. (2020). Diversity of *Betaproteobacteria* revealed by novel primers suggests their role in arsenic cycling. *Heliyon* 6:e03089.

7. Cramm, M.A., **A. Chakraborty**, C. Li, S.E. Ruff, B.B. Jørgensen and C.R.J. Hubert*. (2019). Freezing tolerance of thermophilic bacterial endospores in marine sediments. *Frontiers in Microbiology* 10:945.
6. Dong*, X., C. Greening, J.E. Rattray, **A. Chakraborty**, M. Chuvochina, D. Mayumi, J. Dolfing, C. Li, J.M. Brooks, B.B. Bernard, R.A. Groves, I.A. Lewis and C.R.J. Hubert*. (2019). Metabolic potential of uncultured bacteria and archaea associated with petroleum seepage in deep-sea sediments. *Nature Communications* 10:1816.
5. **Chakraborty***, A., E.D. Ellefson[§], C. Li, D. Gittins, J.M. Brooks, B.B. Bernard and C.R.J. Hubert. (2018). Thermophilic endospores associated with migrated thermogenic hydrocarbons in deep Gulf of Mexico marine sediments. *The ISME Journal* 12:1895-1906.
4. **Chakraborty, A.** and F. Picardal*. (2013). Induction of nitrate-dependent Fe(II) oxidation by Fe(II) in *Dechloromonas* sp. UWNR4 and *Acidovorax* sp. 2AN. *Applied and Environmental Microbiology* 79:748-752.
3. **Chakraborty, A.** and F. Picardal*. (2013). Neutrophilic, nitrate-dependent, Fe(II) oxidation by a *Dechloromonas* species. *World Journal of Microbiology and Biotechnology* 29:617-623.
2. **Chakraborty, A.**, E.E. Roden, J. Schieber and F. Picardal*. (2011). Enhanced growth of *Acidovorax* sp. strain 2AN during nitrate-dependent, Fe(II) oxidation in batch and continuous-flow systems. *Applied and Environmental Microbiology* 77:8548-8556.
1. Picardal*, F.W., Z. Zaybak, **A. Chakraborty**, J. Schieber and U. Szewzyk. (2011). Microaerophilic, Fe(II)-dependent growth and Fe(II) oxidation by a *Dechlorospirillum* species. *FEMS Microbiology Letters* 319:51-57.

Manuscripts in review

Rattray*, J.E., **A. Chakraborty**, G. Elizondo[§], E. Ellefson[§], B. Bernard, J. Brooks and C.R.J. Hubert. (Submitted in *Geobiology*). Endospores associated with deep seabed geofluid features in the Eastern Gulf of Mexico.

Gittins*, D.A., P.A. Desiage, N. Morrison, J.E. Rattray, S. Bhatnagar, **A. Chakraborty**, J. Zorz, C. Li, O. Horanszky[§], M.A. Cramm, J. Webb, A. MacDonald, D.C. Campbell and C.R.J. Hubert. (Submitted in *Science Advances*). Geological processes mediate a subsurface microbial loop in the deep biosphere.

Book chapters

2. **Chakraborty, A.** and P. Bhadury. (2015). Effect of pollution on aquatic microbial diversity. *Environmental Microbial Biotechnology* (Eds Sukla L.B. et al), Springer pp. 53-75.
1. **Chakraborty, A.**, C.K. DasGupta, and P. Bhadury. (2014). Application of molecular techniques for the assessment of microbial communities in contaminated sites. *Microbial Biodegradation and Bioremediation* (Ed Das S.), Elsevier pp. 85-113.

Presentations

Conferences (*presenting author)

Rattray, J.*, G. Elizondo, **Chakraborty, A.**, B. Bernard, J. Brooks and C. Hubert. Dipicolinic acid as a tracer for thermospores and hydrocarbon seeps in deep water marine sediments. Presented at the 29th *International Meeting on Organic Geochemistry* in Gothenburg, Sweden on September 1-6, 2019. (Oral)

Chakraborty, A.*, M. Wong, S. Joye, J. Kostka, B. Bernard, J. Brooks and C. Hubert. Thermophilic endospores associated with petroleum and geofluid seepage in Gulf of Mexico marine sediments. Presented at the 7th *International Symposium in Applied Microbiology and Molecular Biology in Oil Systems* in San Diego, USA on June 18-21, 2019. (Poster; awarded best poster)

Li, C.* , D. Ferguson, O. Adebayo, **Chakraborty, A.**, J. Webb, M. Fowler, C. Campbell, A. MacDonald and C. Hubert. Microbial bioindicators for de-risking offshore deep water oil and gas exploration. Presented at the 7th *International Symposium in Applied Microbiology and Molecular Biology in Oil Systems* in San Diego, USA on June 18-21, 2019. (Poster)

Gittins, D.* , **A. Chakraborty**, C. Li, C. Campbell, A. MacDonald, M. Fowler, J. Webb and C. Hubert. Examining the role of thermophilic, endospore-forming bacteria in de-risking offshore petroleum exploration. Presented at the 7th *International Symposium in Applied Microbiology and Molecular Biology in Oil Systems* in San Diego, USA on June 18-21, 2019. (Poster)

Ferguson, D.* , C. Li, **Chakraborty, A.**, J. Webb, M. Fowler, A. MacDonald, C. Campbell and C. Hubert. Marine bacterial diversity in seafloor sediments for environmental baseline monitoring prior to deep sea offshore oil exploration. Presented at the 7th *International Symposium in Applied Microbiology and Molecular Biology in Oil Systems* in San Diego, USA on June 18-21, 2019. (Oral)

Ratray, J.* , G. Elizondo, **Chakraborty, A.** and C. Hubert. Dipicolinic acid as a tracer for thermospores and oil seeps in marine sediments. Presented at the 7th *International Symposium in Applied Microbiology and Molecular Biology in Oil Systems* in San Diego, USA on June 18-21, 2019. (Oral)

Cramm, M.* , **A. Chakraborty**, P. Archambault, R. Izett, A. Jaggi, K. Polcwiartek, V. Auger, J. Chen, M. Bautista, S. Bhatnagar, R. Clark, C. Li, B de Moura Neves, E. Edinger, P. Lockhart, C. Manning, A. Mort, T. Oldenburg, P. Tortell, V. Wareham Hayes, G. Stern and C. Hubert. Characterization of a high arctic seabed hydrocarbon seep at Scott Inlet, Baffin Bay. Presented at the 14th annual scientific meeting of *ArcticNet* in Ottawa, Canada on December 10-14, 2018. (Poster)

Li, C. * , D. Ferguson, **A. Chakraborty**, O. Adebayo, J. Webb, M. Fowler, C. Campbell, A. MacDonald and C. Hubert. Microbial bioindicators for de-risking offshore deep water oil and gas exploration. Presented at the 24th annual meeting of the *Reservoir Microbiology Forum* in London, UK on October 31 - November 1, 2018. (Poster)

Chakraborty, A.*, M. Wong, S. Joye, J. Kostka, B. Bernard, J. Brooks and C. Hubert. Thermophilic Clostridia associated with petroleum and geofluid seepage in Gulf of Mexico marine sediments. Presented at the 24th annual meeting of the *Reservoir Microbiology Forum* in London, UK on October 31 - November 1, 2018. (Poster)

Gittins, D.* , **A. Chakraborty**, C. Li, C. Campbell, A. MacDonald, M. Fowler, J. Webb and C. Hubert. Examining the role of thermophilic, endospore-forming bacteria in de-risking petroleum exploration. Presented at the 17th *International Symposium on Microbial Ecology* in Leipzig, Germany on August 12-17, 2018. (Poster)

Li, C.* , D. Stacey, **A. Chakraborty**, O. Adebayo, J. Webb, M. Fowler, C. Campbell, A. MacDonald and C. R. J. Hubert. Anomalies of uncultivated *Atribacteria* in deep sea hydrocarbon seep surface sediments. Presented at the 17th *International Symposium on Microbial Ecology* in Leipzig, Germany on August 12-17, 2018. (Poster)

Stacey, D.* , C. Li, **A. Chakraborty**, A. MacDonald, C. Campbell and C. R. J. Hubert. Marine microbial diversity in deepwater seafloor sediments for environmental baseline monitoring prior to

deep sea offshore oil exploration. Presented at the 17th *International Symposium on Microbial Ecology* in Leipzig, Germany on August 12-17, 2018. (Poster)

Chakraborty, A., E. Ellefson, C. Li, D. Gittins, J. M. Brooks, B. B. Bernard and C. R. J. Hubert*. Thermophilic endospores associated with migrated thermogenic hydrocarbons in deep Gulf of Mexico marine sediments. Presented at the 17th *International Symposium on Microbial Ecology* in Leipzig, Germany on August 12-17, 2018. (Oral)

Rattray, J.* , **A. Chakraborty**, B. Bernard, J. Brooks and C. Hubert. Investigation into spore coat properties for the rapid identification of endospores in marine sediments. Presented at the 50th Annual Fall Meeting of the *American Geophysical Union* in Louisiana, USA on December 11-15, 2017. (Poster)

Rattray, J.* , D. Gittins, **A. Chakraborty**, B. Bernard, J. Brooks, T. Oldenburg and C. Hubert. Investigation into spore coat properties for the rapid identification of endospores in marine sediments. Presented at the *Gussow Conference* in Banff, Canada on October 10-12, 2017. (Poster)

Gittins, D.* , **A. Chakraborty**, C. Li and C. Hubert. Examining the potential for using bacterial endospores in de-risking offshore petroleum exploration. Presented at the *Gussow Conference* in Banff, Canada on October 10-12, 2017. (Poster)

Hubert, C.* , **A. Chakraborty**, C. Li, D. Gittins, E. Ellefson, B. Bernard and J. Brooks. Distributions of thermophilic, endospore-forming bacteria in hydrocarbon seep prospective sediments in the Eastern Gulf of Mexico. Presented at the *International Workshop on Marine Geomicrobiology* in Aarhus, Denmark on August 28-September 1, 2017. (Poster)

Cramm, M.* , E. Ruff, **A. Chakraborty**, C. Li and C. Hubert. Freezing tolerance of thermophilic endospores in Arctic marine sediments. Presented at the 1st *Geobiology Society Conference* in Banff, Canada on June 11-14, 2017. (Poster)

Li, C.* , D. Stacey, **A. Chakraborty**, B. Bernard, J. Brooks, A. MacDonald, J. Webb, M. Fowler and C. Hubert. Cultivation-independent microbial genomics for de-risking offshore deep water oil and gas exploration. Presented at the 6th *International Symposium in Applied Microbiology and Molecular Biology in Oil Systems* in San Diego, USA on June 6-9, 2017. (Oral)

Chakraborty, A.*, C. Li, D. Gittins, E. Ellefson, B. Bernard, J. Brooks and C. Hubert. Distributions of thermophilic, endospore-forming bacteria in hydrocarbon seep prospective sediments in the Eastern Gulf of Mexico. Presented at the 6th *International Symposium in Applied Microbiology and Molecular Biology in Oil Systems* in San Diego, USA on June 6-9, 2017. (Oral and Poster)

Fustic, M.* , B. Neves, R. Dove, M. Fowler, A. Mort, **A. Chakraborty**, E. Ellefson, E. Herder, V. Wareham, S. Dufour, E. Edinger and C. Hubert. Saglek basin macro- and micro-hydrocarbon seeps – new evidence, reinterpretation and emerging exploration tools. Presented at *GeoConvention* in Calgary, Canada on May 15-19, 2017. (Oral)

Hubert, C., E. Ellefson, and **A. Chakraborty***. Biogeography of thermophilic, endospore-forming bacteria in deep water hydrocarbon seep sediments of the Eastern Gulf of Mexico. Presented at the 49th Annual Fall Meeting of the *American Geophysical Union* in San Francisco, USA on December 12-16, 2016. (Poster)

Chakraborty, A.* and C. Hubert. Thermophilic, spore-forming, sulfate-reducing bacteria in deep water hydrocarbon seep sediments from the Eastern Gulf of Mexico. Presented at the 21st annual meeting of the *Reservoir Microbiology Forum* in London, UK on November 17-18, 2015. (Oral)

Chakraborty, A.*, B. R. O'Connor, and F. Picardal. Induction of nitrate-dependent, Fe(II) oxidation by Fe(II): possibility of substrate-dependent enzyme expression. Presented at the

Annual Meeting of the Indiana Branch of the *American Society for Microbiology* in Bloomington, USA, on April 21-22, 2012. (Oral)

Chakraborty, A., J. Schieber, and F. Picardal*. Enhanced growth of *Acidovorax delafieldii* 2AN during nitrate-dependent Fe(II) oxidation in continuous-flow systems. Presented at the 21st Annual *Goldschmidt Conference* in Prague, Czech Republic, on August 14-19, 2011. (Oral)

Chakraborty, A.*, J. Schieber, and F. Picardal. Influence of nitrate-dependent, Fe(II) oxidation on growth of *Acidovorax delafieldii* 2AN: a comparative approach. Presented at the 111th Annual Meeting of the *American Society for Microbiology* in New Orleans, USA, on May 21-24, 2011. (Poster)

Picardal, F. W.*, Z. Zayback, **A. Chakraborty**, J. Schieber, and U. Szewzyk. Microaerophilic, Fe(II)-dependent growth during Fe(II) oxidation of a *Dechlorospirillum* species. Presented at the 111th Annual Meeting of the *American Society for Microbiology* in New Orleans, USA, on May 21-24, 2011. (Poster)

Chakraborty, A.*, J. Schieber, and F. Picardal. Influence of nitrate-dependent, Fe(II) oxidation on growth of *Acidovorax delafieldii* 2AN: a comparative approach. Presented at the Annual Meeting of the Indiana Branch of the *American Society for Microbiology* in Bloomington, USA, on April 15-16, 2011. (Poster; awarded best poster)

Invited seminars

Thermophilic, spore-forming, sulfate-reducing bacteria in deep water hydrocarbon seep sediments from the Eastern Gulf of Mexico. Presented at the School of Civil Engineering & Geosciences, Newcastle University, Newcastle upon Tyne, UK, on November 19, 2015.

Microbiology and biogeochemistry of nitrate-dependent, Fe(II) oxidation: bacterial growth and physiology. Presented at the O'Neill School of Public and Environmental Affairs, Indiana University, Bloomington, USA, on September 20, 2012.

Anaerobic bacterial Fe(II) oxidation. Presented at the Department of Geological Sciences, Indiana University, Bloomington, USA, on November 5, 2010.

Awards and grants

Mitacs Elevate Postdoctoral Fellowship, 2014-2017 (135,000 CAD)

D. S. Kothari Postdoctoral Fellowship, UGC, 2013-2014 (576,000 INR)

SPEA travel grant, 2011 (800 USD)

IBASM annual grant for graduate student research, 2011 (1,000 USD)

Leland S. McClung Award (for best poster), IBASM annual meeting, 2011

IU SEED grant for summer research, 2010 (12,000 USD)

O'Neill School of Public and Environmental Affairs Graduate Fellowship, 2007-2008 (22,500 USD)

Gold medal for first rank in M.Sc. Environment Management, 2006

FRI annual fellowship for academic excellence, 2004-05 (15,000 INR)

Field research experience

Marine expeditions

Participant of Expedition AT42-11, Juan de Fuca Ridge, Pacific Ocean, onboard R/V *Atlantis* with ROV *Jason* in 2019 (13 days at sea)

- Activity: Collected and preserved seafloor crustal fluids and ROV sediment cores for genomics and incubation experiments.

Team leader of the University of Calgary, Canadian Arctic (Labrador Sea and Baffin Bay), onboard R/V *CCGS Amundsen* in 2018 (24 days at sea)

- Activity: Planned and executed targeted multiple ROV dives to collect seawater samples over and around a hydrocarbon seep at Scott Inlet. Collected and preserved seawater from Rosette sampler and sediment from box cores for genomics, transcriptomics and incubation experiments.

Team leader of the University of Calgary, Canadian Arctic (Baffin Bay and Nares Strait), onboard R/V *CCGS Amundsen* in 2016 (42 days at sea)

- Activity: Participated in ROV dives and sample collection in Saglek Basin and Scott Inlet. Collected and preserved seawater from Rosette sampler and sediment from box cores and gravity cores for genomics and incubation experiments. Conducted shipboard incubation experiments on microbial hydrocarbon degradation.

Team member of the University of Calgary, North Atlantic (Scotian Slope), onboard R/V *CCGS Hudson* in 2015 (12 days at sea)

- Activity: Collected and sediment from piston cores for genomics and incubation experiments. Conducted shipboard incubation experiments for tracking germination and activity of spore-forming thermophilic bacteria in sediment samples.

Other fieldwork

Sampling of nitrate-contaminated groundwater, Abbotsford, Canada (2018, 2016)

Sampling of arsenic-contaminated groundwater, West Bengal, India (2013-2014)

Sampling of produced water from coalbed methane wells, Indiana, USA (2011)

Teaching experience

2022	Graduate level course titled Cell and Molecular Biology and Lab (BIOL 5544, BIOL 5544L), Department of Biological Sciences, Idaho State University.
2022	Upper-level undergraduate level course titled Cell and Molecular Biology and Lab (BIOL 4444, BIOL 4444L), Department of Biological Sciences, Idaho State University.
2019, 2020	Guest Lecturer (two semesters; two lectures per semester), graduate level course titled Petroleum Microbiology (CMMB545), Department of Biological Sciences, University of Calgary. Lectured on microbiology of hydraulically fractured shale reservoirs.
2017	Guest Lecturer (one semester), graduate level course titled Geoscience Graduate Skills (GLGY699), Department of Geosciences, University of Calgary. Lectured on peer reviewing scientific manuscripts and grant proposals.
2011-2012	Course Instructor (three semesters), fourth year undergraduate course titled Water Supply and Wastewater Treatment (E431), O'Neill School of Public and Environmental Affairs, Indiana University Bloomington. Taught

- class room lectures and conducted class visits to local drinking water and waste water treatment plants.
- 2009 Course Instructor (one semester), graduate level course titled Subsurface Microbiology and Bioremediation (E544), O'Neill School of Public and Environmental Affairs, Indiana University Bloomington. Taught class room lectures.
- 2008 Teaching Assistant (one semester), fourth year undergraduate course titled Water Supply and Wastewater Treatment (E431), O'Neill School of Public and Environmental Affairs, Indiana University Bloomington. Graded examinations and conducted help sessions for students.

Supervisory experience

Graduate students (Laboratory and project supervision)

- 01/2020 - 11/2021 Gabrielle Scheffer, PhD student, University of Calgary.
Project: Ecophysiology of halothermophilic bacteria in hydraulically fractured shale reservoirs.
- 07/2019 - 11/2021 Brielle Hrymoc, PhD student, University of Calgary.
Project: Distribution of thermophilic bacterial endospores in subseafloor oceanic crusts and mid-ocean ridges.
- 01/2016 - 11/2021 Daniel Gittins, PhD student, University of Calgary.
Project: Potential of thermophilic bacterial endospores in de-risking offshore petroleum exploration.
- 2015 - 2017 Margaret Cramm, MSc student, University of Calgary.
Thesis: Freezing tolerance of thermophilic endospores in cold marine sediments.
- 2015 Mohit Sethi, graduate intern student, University of Calgary.
Project: Commercialization capabilities of microbiological assays in exploration of marine hydrocarbon seeps.

Undergraduate students

- 2020 Dana Jwad, summer student, University of Calgary
Project: Microbiome of produced waters from hydraulically fractured shale reservoirs
- 2019-2020 Dana Jwad, CMMB528 thesis course, University of Calgary
Thesis title: Microbial activity in shale reservoirs
- 2019-2020 Rohan Khan, summer student (two summers), University of Calgary
Recipient of The Program for Undergraduate Research Experience Award in summer 2020, University of Calgary
Project: Using machine learning to identify microbial clades associated with hydrocarbon rich marine sediments
- 2017-2018 Michelle Wong, summer student (two summers), University of Calgary

- Recipient of Undergraduate Student Research Award, NSERC in summer 2017*
Project: Distribution of thermophilic *Clostridia* in hydrocarbon seep sediments
- 2017-2018 Michelle Wong, CMMB528 thesis course, University of Calgary
Thesis title: DNA extraction method from bacterial endospores in estuarine sediment
- 2015-2018 Emily Ellefson, summer student (four summers), University of Calgary
Project: Amplicon sequencing analysis of microbial communities in hydrocarbon-impacted marine sediments
- 2016 Emily Ellefson, GLGY599 thesis course, University of Calgary
Thesis title: Geomicrobiological characterization of marine mud volcanoes in the Eastern Gulf of Mexico
- 2015 Sienna Drake, summer student, University of Calgary
Project: Organic matter degradation by thermophilic endospores in marine sediments from Svalbard
- 2011-2012 Bridget O'Connor, senior thesis student, Indiana University Bloomington
Thesis title: Induction of nitrate-dependent, Fe(II) oxidation by Fe(II) in *Acidovorax* sp. 2AN and *Dechloromonas* sp. UWNR4

Professional service, education and outreach

Professional memberships

International Society for Subsurface Microbiology (2014 - Current)

American Society for Microbiology (2010-2012)

Indiana Branch of American Society for Microbiology (2010-2012)

Reviewer / Editor

Review editor for *Frontiers in Microbiology* (Sections – microbiological chemistry and geomicrobiology; extreme microbiology)

Ad hoc reviewer for: *Canadian Journal of Microbiology*, *FEMS Microbiology Ecology*, *Applied and Environmental Microbiology*, *Scientific Reports*, *iScience*, *Applied Microbiology and Biotechnology*, *Environmental Science & Technology*, *Geobiology*, *Geochimica et Cosmochimica Acta*, *Antonie van Leeuwenhoek*

Outreach activities

Panel member of judges for evaluating science projects completed by elementary and middle school students in Calgary Youth Science Fair (2016)

Panel member of judges for undergraduate oral (CMMB 538/530) and poster (CMMB 545) presentation competitions at the University of Calgary (2015)