

Georges Kanaan

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Education

PHD IN OCEANOGRAPHY & ASTROBIOLOGY FROM UNIVERSITY OF WASHINGTON, SEATTLE	DEC 2025
Dissertation on methylation in sea-ice bacteria. Supervised by Dr. Jody Deming.	
MASTER OF OCEANOGRAPHY FROM UNIVERSITY OF WASHINGTON, SEATTLE	FEB 2023
Focus in Biological Oceanography. Supervised by Dr. Jody Deming. Co-advised by Dr. Jodi Young.	
BACHELOR OF COMPUTER & COGNITIVE SCIENCE FROM UNIVERSITY OF TORONTO	JUN 2021
Completed courses in AI, NLP, CS Theory, Game Design, and Philosophy among others.	
FRENCH BACCALAUREATE FROM INTERNATIONAL COLLEGE, BEIRUT	JUN 2017
Graduated with distinction. Science track with a focus in Biology.	

Academic Research

ICE PLUME ORGANICS, COLLABORATION WITH DR. MARC NEVEU	APRIL 2024–ONGOING
<ul style="list-style-type: none">Part of an astrobiology research rotation at Goddard Space Flight Center.Cultured a model sea-ice bacteria and obtained extracellular polysaccharides from it.Injected the extracellular polysaccharides into a vacuum simulating Enceladus plume conditions.Assessed effect of vacuum on polysaccharide structure and detectability within the context of the search for life.	
DNA METHYLATION IN PSYCHROPHILES, GRADUATE STUDENT WITH DR. JODY DEMING	FEB 2023–ONGOING
<ul style="list-style-type: none">Planned and executed a sea-ice field campaign to collect sackhole brines from different sea-ice horizons.Sequenced environmental samples using Nanopore to obtain DNA methylation data.Designed an experiment to understand DNA methylation's role in a model sea-ice bacterium's stress response.Setup a chemostat and growth system with continuous optical density measurement.	
BACTERIAL ENERGETICS, GRADUATE STUDENT WITH DR. JODY DEMING	SEP 2022–FEB 2023
<ul style="list-style-type: none">Developed a model to understand the required energetic input to support the bacterial community in subzero brine.Conducted a sensitivity analysis of the different inputs to characterize the accuracy of the model output.Manuscript published in a special volume of <i>Frontiers in Microbiology 2023</i>.Abstract accepted for a poster presented at <i>Microenergy 2022</i>.Participated in a workshop to co-author a synthesis paper on the larger cryopeg research project.	
ARCTIC OIL BIOREMEDIATION, GRADUATE STUDENT WITH DR. JODY DEMING	SEP 2021–JAN 2023
<ul style="list-style-type: none">Proposed and received a grant to investigate novel bioemulsifiers produced by arctic sea ice bacteria.Developed a plan to characterize the commercial viability of an identified bioemulsifier based on EPA requirements.Cultured multiple species of arctic bacteria to survey their emulsification production capacity.Confirmed emulsification capacity on kerosene, then tested on crude oil.Mentored an undergraduate who continued work on this project for two months.	
NEURAL PLASTICITY & UNSUPERVISED LEARNING, INDEPENDENT	JUL 2019–MAY 2020
<ul style="list-style-type: none">Recruited and led a team of three undergraduate students, acting as principal investigator and first author.Researched and developed novel ideas to model neural plasticity in neural networks.Presented our research in a second-year cognitive science class at the University of Toronto.Published a research paper in a public computer science archive.	
UNIVERSITY OF TORONTO, SCDMS, RESEARCH ASSISTANT TO DR. MIRIAM DIAMOND	MAY–DEC 2020
<ul style="list-style-type: none">Grant from Arthur McDonald Canadian Astroparticle Physics Research Institute.Acquired a knowledge-base in particle physics in order to apply machine learning to physics problems.Researched and engineered both supervised and unsupervised machine learning solutions to discriminate between single and multiple recoil events in the particle detector using HPC techniques on ComputeCanada supercomputers.Worked closely with physicists to understand the data and produce the adequate feature set through feature engineering, along with my partner research assistant.	
UNIVERSITY OF TORONTO, MANNLAB, RESEARCH ASSISTANT TO DR. STEVE MANN	MAY 2019–APR 2020
<ul style="list-style-type: none">Developed a working Brain-Computer interface with Muse EEG, Arduino and Raspberry Pi to perform Steady State Visually Evoked Potentials experiments.Captured the world's first image of vision and of multiple ayinographs, recording the eye's input as a camera using SSVEP, in line with the lab's sousveillance theme. Implemented possibly the first digital lock-in amplifier on iOS.Researched and developed a new way to treat prosopagnosia using a computer vision and mobile applications.	
AMERICAN UNIVERSITY OF BEIRUT, RESEARCH ASSISTANT TO DR. AHMAD DHAINI	MAY–AUG 2018
<ul style="list-style-type: none">Rewrote and worked on adapting an existing optical coherence tomography scanning algorithm to different scanner formats.Used machine learning to identify valid corneal scan frames from the original video format.Used OpenCV to detect corneal haze contours and the corneal demarcation line.My contributions and findings directly resulted in a comparative study eligible for publication.	

Field Work

SCOPE 2025, HOKKAIDO, JAPAN

JAN 2025–12 DAYS

- Participated in the SCOPE 2025 international expedition as a researcher.
- Successfully planned and executed my a field campaign for the collection of freshwater frost flowers from lake Akana and sea ice samples from Saroma-ko lagoon.

BREATHE 2023, YERMACK PLATEAU, ARCTIC OCEAN

MAY 2023–19 DAYS

- Participated in the BREATHE 2023 expedition as an invited researcher aboard R/V *Kronprins Haakon*.
- Successfully planned and executed my own field campaign for the collection of sea ice brine for genomic work.

VISIONS'22, NORTH EASTERN PACIFIC OCEAN

AUGUST 2022–10 DAYS

- Funded to participate on the first leg of the cruise aboard the R/V *Thomas G. Thompson*.
- Led a 6 hour ROPOS dive to sample diffuse flow hydrothermal vent fluid at Axial seamount for Dr. Rika Anderson.

BIOGEOCHEMICAL EXCHANGES AT SEA ICE INTERFACES, CANADIAN ARCTIC

MAY 2022–14 DAYS

- Funded to attend the BEPSII summer field school in Cambridge Bay, Canada in the Arctic.
- Attended over 30 hours of lecture on sea ice physics, chemistry and biology.
- Learned fundamental field techniques for sampling: snow characterization, ice coring, sack hole brine sampling, seawater sampling, photosynthetic active radiation measurements.

Teaching

OCEAN SENSOR, TEACHING ASSISTANT, UNIV. OF WA., SCHOOL OF OCEANOGRAPHY

JAN–MAR 2025

- Supervised 36 hours of practical lab time in which students built sensors from the ground up including programming microcontrollers, assembling breadboard circuits, calibration, and data collection and analysis.
- Responsible for grading a class of 40 students on topics related to ocean sensors, their function and engineering, usefulness in ocean monitoring.

HYDROTHERMAL VENTS, TEACHING ASSISTANT, UNIV. OF WA., SCHOOL OF OCEANOGRAPHY

JAN–MAR 2024

- Responsible for grading a class of 77 students on topics related to hydrothermal vents, their function in the ocean, underlying mechanisms, history and discovery, etc.

UNDERGRADUATE MENTORSHIP, UNIVERSITY OF WASHINGTON

APR–ONGOING

- Mentored several undergraduate students. Teaching and mentoring on: sterile technique, bacterial culturing, epifluorescence microscopy, DNA extractions, optical density, project management, academic orientation, experimental design and planning.
- One undergraduate student completed his senior thesis as part of my mentoring effort with Dr. Jody Deming, and was subsequently accepted into a doctoral program.

MARINE POLLUTION, TEACHING ASSISTANT, UNIV. OF WA., SCHOOL OF OCEANOGRAPHY

APR–JUN 2022

- Responsible for grading a class of 50 students on a wide range of marine pollution topics such as plastics, noise, light, etc.
- Guest lecturer on ocean acidification and guided an in-class paper discussion.

Presentations, Posters & Workshops

GRC POLAR MARINE SCIENCE 2025, USA.

MARCH 2025

POSTER: BACTERIAL USE OF ANA METHYLATION TO ACCLIMATE TO SEA ICE.

GRS POLAR MARINE SCIENCE 2025, USA.

MARCH 2025

TALK: A SEA-ICE PERSPECTIVE ON BACTERIAL DNA METHYLATION.

INSTITUT BIOLOGIQUE DE L'ÉCOLE NORMALE SUPÉRIEURE, FRANCE.

DEC 2024

INVITED TALK: BACTERIAL USE OF DNA METHYLATION IN SEA ICE.

INTERNATIONAL SOCIETY FOR MICROBIAL ECOLOGY 2024, SOUTH AFRICA.

AUG 2024

POSTER: EXTREMOPHILE DNA METHYLATION AND EPIGENETIC MEMORY.

EBAME 8 WORKSHOP ON COMPUTATIONAL MICROBIAL ECOGENOMICS, FRANCE.

OCT 2024

GRC POLAR MARINE SCIENCE 2023, USA.

FEB 2023

POSTER: SEARCHING FOR MEMORY: METHYLATION IN SEA ICE BACTERIA.

GRS POLAR MARINE SCIENCE 2023, USA.

FEB 2023

TALK: THE POTENTIAL FOR BACTERIAL MEMORY IN SEA ICE.

MICROENERGY 2022, DENMARK. POSTER: MAINTENANCE ENERGY IN CRYOPEG BRINES

SEP 2022

Publications

- Georges Kanaan and Jody Deming. 2025. **DNA methylation plays a regulatory role in bacterial sea ice acclimation.** *International Society for Microbial Ecology.* (In prep.)

- Jody Deming [and 9 others, including Georges Kanaan]. 2025. **Uncovering the mysteries of cryopegs: Geo-microbial evolution in subzero brines geophysically isolated within permafrost.** *Proceedings of the National Academic of Science (in prep.)*.
- Zac Cooper, Anna Shoemaker, Shelly Carpenter, Georges Kanaan, and Jody Deming. 2025. **Marinobacter cryopegus sp. nov., isolated from cryopeg brines contained within coastal Northern Alaska permafrost.** *International Journal of Evolutionary and Systematic Microbiology (in prep)*.
- Georges Kanaan, Tori M. Hoehler, Go Iwahana, and Jody W. Deming. 2023. **Modeled energetics of bacterial communities in ancient subzero brines.** *Frontiers in Microbiology: Studies on life at the energetic edge*.
- Georges Kanaan, Kai Wen Zheng, and Lucas Fenaux. 2021. **A Novel Approach to Lifelong Learning: The Plastic Support Structure.** *arXiv 2106.06298*.
- Steve Mann [and 7 others, including Georges Kanaan]. 2020. **Face Recognition and Rehabilitation: A Wearable Assistive and Training System for Prosopagnosia.** *In the 2020 IEEE International Conference on Systems, Man and Cybernetics (SMC' 20)*.
- Steve Mann [and 9 others, including Georges Kanaan]. 2019. **The Human Eye as a Camera.** *In the 2019 IEEE International Conference on E-health Networking, Application & Services (HealthCom' 19)*.
- Steve Mann [and 12 others, including Georges Kanaan]. 2019. **Keynote – Eye Itself as a Camera: Sensors, Integrity, and Trust.** *In the 5th ACM Workshop on Wearable Systems and Applications (WearSys'19)*.

Co-authored Presentations, Posters & Workshops

INTERNATIONAL SOCIETY FOR MICROBIAL ECOLOGY, SOUTH AFRICA.

AUG 2025

TALK: VESELI ET AL. MAKING BIG DATA ACCESSIBLE TO MICROBIOLOGISTS: LESSONS FROM DEVELOPING A VERSATILE SOFTWARE ECOSYSTEM FOR MULTI-'OMICS ANALYSIS

Professional Experiences

NASA – JOHNSON SPACE CENTER, INTERN

JUN–AUG 2020

- Cancelled due to COVID-19.
- Accepted to work on EVA informatics, specifically on EVA Operations System a suite of decision support tools and capabilities for the creation, distribution, and utilization of operationally relevant EVA workflows and data.

NASA – GODDARD SPACE FLIGHT CENTER, NETWORKING INTERN

JUN–AUG 2019

- Procured hardware for network emulation testing within a constrained budget.
- Developed and tested an emulation of a space network both at the hardware and software level to study the implementation of Delay/Disruption Tolerant Network protocols, such as the Bundle Protocol.
- Developed a specialized network management tool that allows for monitoring DTNs, furthering NASA's goal to be a reliable space network provider. This tool was tested on the purpose built DTN emulation hardware.
- Led the development of the network management tool. Including network overview, asynchronous management protocol interface, and visualizations for critical AMP data points. Resulted in an academic poster.

ANGHAMI, IOS DEVELOPER INTERN

JUN–AUG 2017

- Independently integrated the music syncing protocol from Airly, an app I developed, as a revenue generating feature for the service.
- Contributed to ongoing development of the mobile app in collaboration with the iOS engineering team.

PRICEWATERHOUSECOOPERS, CYBER SECURITY INTERN

JUL 2016

- Contributed to writing client side technical specifications which were used in key decision-making discussions.
- Attended company workshops pertaining to their cyber security consulting division, furthering my skills in that area.
- Shadowed professional pen testers for a day, immersing myself in a professional cybersecurity environment.

SAILY, IOS DEVELOPER INTERN

MAY–JUL 2015

- Assumed responsibility for design, implementation and testing of critical parts of the Saily App in a small team.
- Independently built the Saily Apple Watch app from the ground up.

961 BEER, CONTRACTED IOS DEVELOPER

NOV 2014–MAY 2015

- Contracted to develop and manage an iOS app to locate storefronts selling the company's product.
- Responsible for design, implementation, maintenance and release of the app.
- Implemented network features to ensure constant availability of the database in the app.

FOO_, IOS DEVELOPER INTERN

JUN–JUL 2014

- Contributed to the development of ongoing projects for clients making use of various custom APIs.
- Built an in-house crash-reporting tool using custom APIs to transfer the crash logs to the company's database.
- Researched facial recognition technology demonstrating the OpenCV framework with the capability of recognising facial features such as left eye, glasses, eyebrows.

Awards, Grants & Scholarships

UNIVERSITY OF WASHINGTON, HALL CONSERVATION GENETICS AWARD

APR 2023

- Awarded to fund a proposal I developed on DNA methylation of sea-ice bacteria. 10,000 USD.

NASA, WASHINGTON SPACE GRANT

SEP 2022

- Awarded to fund a NASA science mission directorate project, modeling bacterial energetics in the extreme environment of subzero brine. 4,000 USD.

UNIVERSITY OF WASHINGTON, SCHOOL OF OCEANOGRAPHY, LEO CUP AWARD SEP 2021

- Awarded to the best proposal for oceanographic research tackling marine pollution. One year of support worth 40,000 USD.

ARTHUR B. MCDONALD CANADIAN ASTROPARTICLE PHYSICS RESEARCH INSTITUTE MAY 2020

- One semester of support for interdisciplinary research in particle physics. 10,000 USD.

INTERNATIONAL COLLEGE TPE EXCELLENCE AWARD JUN 2017

- Awarded to the student with the most original and best performing presentation on the national exam.

APPLE-WWDC SCHOLARSHIP WINNER JUN 2015

- Won a scholarship awarded to 350 students. Attended labs and sessions held by Apple engineers including the UI Design Labs. Met Apple engineers and discussed future technologies and ongoing personal projects.

ALTCITY HACKATHON-RUNNER UP (MOVE-COUNTER APP) MAY 2014

- Designed, developed and pitched a working app in 12 hours with the help of a designer. Other participants were aged between 18 and 30. The app I built, Move-Counter, sported the capability of recording a given move, storing it as a hash then recognizing the recorded move using the built-in accelerometer. The app was later redesigned and published.

Skills & Certificates

- **Medically certified** for a Winfly in Antarctica in 2023 to Palmer station for 6 months.
- **Languages:** French, Arabic, English.
- **Microbial Lab Techniques:** Sterile technique, culturing, isolation, kerosene emulsification index assay, phenol sulfuric-acid assay, centrifugation, epifluorescence microscopy, nucleic acid extraction.
- **Field Techniques:** Ice coring, sack hole brine coring, PAR measurement, snow sampling, seawater sampling.
- **Programming Languages:** Objective-C/C, Swift, Python, PHP, Verilog, Bash, HTML, Markdown, CSS, C++, Java.
- **Computer Science:** Windows, Linux/Unix, macOS, Git, Unity, OpenCV, iOS/macOS SDK (Xcode), Spacy, VPS Deployment, Cydia Substrate, SciKit, Muse EEG, Tkinter, DTN, CORE, debuggers (gdb, lldb), PyTorch, HPC.
- **Certificates:** NAUI open water diving, NAUI drysuit diving, Norwegian polar institute regatta suit use, US Antarctic program physical qualification to McMurdo (2023).

Volunteering

PROJECT GROUP CO-LEAD PODCAST, APECS SEPT 2024 - SEPT 2025

- Organized and led the Polar Times science communication podcast for the association of early carrer scientists.
- Oversaw a team of over 15 people divided into teams which produced different month-long topical deep dives.
- Supervised writing, editing, research, interviewing, marketing, recording, and publication.

PROJECT GROUP LEAD MENTORSHIP AWARD, APECS SEPT 2024 - SEPT 2025

- Organized and led the international mentorship award project group for the association of early carrer scientists.

JOURNAL REVIEWER, EXTREMOPHILES 2024

- Invited to review a subsequently published paper in the Extremophiles journal.

COMMITTEE MEMBER, GRADUATE CLIMATE CONFERENCE SEPT 2023 - NOV 2024

- Member of the recordings and evaluation committee.
- Reviewed abstracts submitted for conference participation as an expert on polar regions, oceanography, and microbiology.

PACIFIC SCIENCE CENTER, POLAR SCIENCE DAY VOLUNTEER DEC 2022, MARCH 2024

- Interpret and teach about Arctic Ocean salinity using a salinity taste test game.

SEATTLE AQUARIUM, MARINE SCIENCE INTERPRETER MAY 2022-ONGOING

- Interpret and animate various exhibits on local fauna and flora to thousands of guest.

UW GRADUATE APPLICATION MENTORSHIP PROGRAM, MENTOR OCT-DEC 2021

- Guided two prospective international undergraduate students through the graduate student application process.

UW ACADEMIC & RECREATIONAL GRADUATE OCEANOGRAPHERS, OFFICER SEPT 2021-ONGOING

- Social events coordinator for the School of Oceanography's graduate student student organization.
- Planned and executed many social events for the graduate student body including park hangouts, barbecues, movie nights, and game nights. With my cohort, organized monthly social gatherings and a yearly graduate student retreat.

UNIVERSITY OF WASHINGTON CUBESAT TEAM, MEMBER SEP 2021-MAY 2022

- Worked on satellite communication infrastructure.

UNIVERSITY OF WASHINGTON INDOOR FARMING PROJECT, MEMBER SEP 2021-MAY 2022

- Club focused on hydroponics and sustainable farming. Produces food that is donated weekly to the university food bank.

UNIVERSITY OF TORONTO AEROSPACE TEAM, MEMBER SEP 2019-MAY 2020

- Developed a biological mission concept for the next SmallSat mission involving the study of herpes.

- Reached out to launch companies as well as agencies coordinating biological experiments on ISS to study the feasibility of conducting an experiment in space.

NEUROTECH UOFT, DIRECTOR OF CORTICAL APPS

SEP 2018–MAY 2019

- Responsible for the coordination of the various teams building applications making use of brain computer interfaces.

Press Appearances

- Article in the University of Washington’s School of Oceanography about the Leo Cup Award in 2021.
- Article in the University of Toronto news, and news outlet l’Orient le Jour about my NASA internship in 2019.
- Featured in a segment on young developers and entrepreneurs on a major television station in Lebanon.

Projects

SERVER HOSTING: DNS, VPN, & MORE

NOV 2012–ONGOING

- Maintained a public facing ubuntu server hosting a myriad of services with 99.9% uptime.
- Hosted and configured a secure VPN based on OpenVPN, and later WireGuard.
- Hosted and configured a Minecraft server complete with automatic backups.
- Hosted and configured a personal DNS service using unbound, complete with ad-blocking capabilities using PiHole.
- Hosted and configured a private Siri proxy service used to get Siri on jailbroken iPhone 4.
- Hosted, configured and made my personal website.

PUBLISHED 11 APPS & TWEAKS

- Published 8 iOS Apps, 3 Tweaks (System modifications distributed through Cydia).
- 3 Tweaks received unprompted coverage from respectable review sources.
- *Bloard* (Tweak) received over a million downloads.
- *Airly* (App) improves on the Precision-Time-Protocol and allows precise music playback across devices.

Personal Experience

- **Lived in:** Beirut, London, Toronto, Washington DC, Strasbourg, Seattle.
- **Well traveled** (over 20 countries), and multilingual, I bring a diverse and unique background to any team.
- **Interests:** music, history, running, skiing, biking, computational neuroscience, space, climate change, trains.
- **Self-taught:** I am motivated by my passion for science and curiosity.