



CHARLES (CHARLIE) GAN 

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## STRENGTHS

- Wastewater (WW) RNA extraction and PCR analysis
- Lab scale experimental design (including WW reactor operation)
- Studying microorganisms in complex matrices (fate in seawater)
- Scientific report writing and presentation (Native English)
- Assay design for viral targets using ddPCR (RT-PCR)
- Python, R & GraphPad Prism

## WORK EXPERIENCE

### WASTEWATER-BASED EPIDEMIOLOGY (WBE) SCIENTIST, EAWAG (IN ZURICH)

APR 2024 - CURRENT

#### *Development of new dPCR assays for wastewater based-epidemiology*

- Design of a duplex for *Measles wild type and Measles vaccine strain* (see publications section), a duplex for *Mumps and Rubella* (publication), a single plex for *Pan-poliovirus* (publication), a single plex for *H5N1*, and a 5-plex for *Dengue, West Nile, Chikungunya, Usutu, and Tick-borne encephalitis virus*.
- Designed experiment on inactivation of MS2 in collected RNA extraction waste (publication)
- Coordination of an outside collaboration for a 12-plex assay targeting antimicrobial resistance genes

### WASTEWATER-BASED EPIDEMIOLOGY (WBE) LAB COORDINATOR, EAWAG

JUL 2021 – APR 2024

#### *Detecting viral targets in municipal wastewater as an early alarm system for protecting public health*

- Performing daily viral RNA extraction and digital droplet PCR analysis (RT-PCR)
- Designing and implementing a nationwide ring trial to evaluate sources of variability between commercial/cantonal labs
- Nanopore sequencing using MinION technology – sample and library prep
- Coordinating shipping logistics for on-time delivery of 75 samples from 15 regions of Switzerland
- Contributing to data management and dashboard to inform public health decisions: [wise.ethz.ch](http://wise.ethz.ch)
- Managing a team of four to provide timely data to the Federal Office of Public Health: <https://www.idd.bag.admin.ch/>
- Trained over 10 people (range of academic backgrounds and lab knowledge) over the course of 2 years

### MASTER THESIS STUDENT, EAWAG – SWISS FEDERAL AQUATIC RESEARCH INSTITUTE

FEB 2021 – JULY 2021

#### *Evaluated the effect of operation mode (sequence batch reactor vs. continuous stirred tank reactor) and nutrient limitation on the production of bioplastic from municipal wastewater*

- Design and implementation of a flat ultra-filtration membrane to produce usable feedstocks
- Tailor and test wastewater treatment schemes to convert fatty acids to PHA (plastic precursor)
- In lab analysis of wastewater indicators (TN, TP, COD, sCOD, TCOD, pCOD, NH<sub>4</sub>, PO<sub>4</sub>, TSS, TS, VSS, VS)
- In lab analysis with gas and ion chromatography to identify fatty acids and PHA species
- Iterative adjustment of wastewater reactor systems based on indicators

### PROCESS ENGINEERING INTERN, EAWAG – SWISS FEDERAL AQUATIC RESEARCH INSTITUTE

JUL 2020 – SEPT 2020

#### *Characterized rotating drum and filterband microsieve performance for primary WW treatment*

- Assessed coagulation and flocculation products using jar testing methodology
- Evaluated cost/benefit of chemically enhanced primary treatment (CEPT) + low footprint primary treatment on resource recovery for high value production of PHA and bioplastics

### ENVIRONMENTAL HEALTH SAFETY INTERN, SI GROUP – CHEMICAL MANUFACTURING

MAY 2018 – AUG 2018

#### *Tracking/evaluating hazardous substances and setting best practices for mitigating env. impact*

- Analyzed organic components within a biological wastewater treatment system and established concentration limits to ensure compliance with permit limits and treatment efficiency
- Communicated with and audited external businesses to coordinate HDPE recycling and due diligence
- Developed and collaborated to create a video for onsite wastewater treatment training
- Initiated and investigated solutions to mitigate ammonia output by working with an engineering team

*Experimentally identifying the effect of microorganisms on the inactivation of enteroviruses*

- Performed lab analysis: DBT/BGMK cell culture, gel electrophoresis, PCR, 16s DNA sequencing, viral/protozoa culture, most probable number viral counts, bacteriophage isolation
- Performed experiments with lab scientist to understand protozoa/virus interaction with goal of inactivation
- Worked in a team setting and summarized my work in a 1-hour lecture (writing samples on [Linkedin](#))
- Produced data that is published in an internationally peer-reviewed journal: <https://doi.org/10.1128/aem.01992-19>

## EDUCATION (WRITING SAMPLES ON [LINKEDIN](#))

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SWISS FEDERAL INSTITUTE OF TECHNOLOGY LAUSANNE (EPFL) - SWITZERLAND

SEPT 2019 – SEPT 2021

- Master of Science in Environmental Engineering | **5.05/6.0**
- Excellence Scholarship Recipient

GEORGIA INSTITUTE OF TECHNOLOGY - USA

AUG 2014 – MAY 2019

- Bachelor of Science in Environmental Engineering | **GPA: 3.81/4.0 (Highest Honors)**

## PUBLICATIONS (FIRST AUTHOR)

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Retrospective wastewater tracking of measles outbreak in western Switzerland in winter 2024, ES&T Letters, published 2025, <http://doi.org/10.1021/acs.estlett.5c00244>

Wastewater-based poliovirus surveillance using digital PCR, FOPH Report, published 2025, <https://doi.org/10.55408/eawag:34821>

Evaluating viral inactivation in the liquid waste stream from a viral total nucleic acid extraction kit for safe disposal, Biosafety and Health, 2025, <https://doi.org/10.1016/j.bsheal.2025.09.001>

Wastewater-based surveillance for measles, mumps, and rubella in Switzerland, FOPH Report, published 2025, <https://doi.org/10.55408/eawag:34821>

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## CERTIFICATIONS/PERSONAL DETAILS

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- **Fundamentals of Engineering certificate:** [link](#)
- **Resident Status:** US Citizen/ Authorization Permit B (Switzerland)
- **Hobbies:** Long distance running, bread making, hiking, ultimate frisbee, piano
- **Rshiny Web Development:** <https://charliegan1.shinyapps.io/dPCRLoDCalculator/>
- **Biosafety Level 2** env. exposure (enteric/respiratory pathogens)
- **Languages:** French (A2 spoken, B1 reading/writing), English (native)
- **Awards:** EPFL Excellence Fellowship, Testing the Waters 8 Conference Best Oral Presentation (2025)

**Supplemental courses:** Bioinformatics for Beginners (ZHAW), Learn and Grow dPCR 2.0 (Qiagen Course)