

# CHARLES GAN

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## STRENGTHS

- Wastewater RNA extraction and PCR analysis
- Laboratory management for routine monitoring
- Optimization of Digital Droplet PCR (Bio-Rad and Stilla systems)
- Stakeholder coordination – Project management
- Scientific writing and presentation (Native English)
- Assay design for viral targets using ddPCR (RT-PCR)
- R & GraphPad Prism for plots
- Python

## CORE EXPERIENCE

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

APR 2024 - CURRENT

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

- Design of a duplex for measles wild type and measles vaccine strain ([doi:10.1021/acs.estlett.5c00244](https://doi.org/10.1021/acs.estlett.5c00244))
- Design of a duplex for mumps and rubella ([doi:10.55408/eawag:34821](https://doi.org/10.55408/eawag:34821))
- Design of a single plex for pan-poliovirus ([doi:10.55408/eawag:34819](https://doi.org/10.55408/eawag:34819))
- Design of a single plex for H5N1
- 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
- Developing new assays and validating new digital droplet PCR instruments
- 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](https://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
- Understanding of complex wastewater treatment scheme to convert fatty acids to PHA
- 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
- Troubleshooting of wastewater 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

### STORMWATER INTERN, JACOBS ENGINEERING – ENVIRONMENTAL CONSULTING

JUN 2019 – SEPT 2019

#### *Understanding and implementing stormwater city municipal code to improve regulation workflow*

- Created an As-Built Hydrology Report checklist for the City of Peachtree Corners, GA using municipal code as guidance
- Utilized ArcGIS to populate a stormwater database with new systems installed
- Organized and gathered documentation for Community Rating System (CRS) application as part of FEMA's National Flood Insurance Program

*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 an in-depth guide for onsite wastewater treatment training
- Initiated and investigated solutions to mitigate ammonia output by working with a chartered engineering team

MICROBIOLOGY RESEARCH INTERN, **EPFL** – ENVIRONMENTAL CHEMISTRY LAB

FEB 2017 – JUN 2017

*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 detailed experiments on a timely basis to model and analyze protozoa behavior
- 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: [doi:10.1128/AEM.01992-19](https://doi.org/10.1128/AEM.01992-19)

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

## SWISS FEDERAL INSTITUTE OF TECHNOLOGY LAUSANNE (EPFL) - SWITZERLAND

SEPT 2019 – SEPT 2021

- Master of Science in Environmental Engineering | **GPA: 5.05/6.0**
- Excellence Scholarship Recipient (covering all expenses)

## GEORGIA INSTITUTE OF TECHNOLOGY - USA

AUG 2014 – MAY 2019

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

## PUBLICATIONS

**Retrospective wastewater tracking of measles outbreak in western Switzerland in winter 2024**, ES&T Letters, published 2025, [doi:10.1021/acs.estlett.5c00244](https://doi.org/10.1021/acs.estlett.5c00244)

**Wastewater-based poliovirus surveillance using digital PCR**, FOPH Report, published 2025, [doi:10.55408/eawag:34819](https://doi.org/10.55408/eawag:34819)

## CERTIFICATIONS/PERSONAL DETAILS

- Fundamentals of Engineering certificate: [link](#)
- **Resident Status:** US Citizen/ Authorization Permit B (Switzerland)
- **Hobbies:** Long distance running, bread making, hiking, ultimate frisbee, piano
- 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)

**Research/Industry Interests:** Assay Development, Lab Management, Low Resource Engineering, Informing Public Health, Environmental/Wastewater R&D, Sustainable Community Architecture, Policy for Equitable Resource Access, Analytical Lab Work