Margot Olive, Ph.D.

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Environmental engineer
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Date of birth : 08.11.1994
Citizenships: Swiss and French

Scientific statement

I am deeply interested in understanding water quality's impact on human health, especially waterborne pathogens' role in transmitting infectious diseases. I have specialized in studying host-pathogen and predator-prey interactions, which are intrinsically related to the fate of pathogens in the environment. I apply quantitative microbiology, virology, molecular biology, metagenomics, and bioinformatics tools to comprehensively understand the underlying mechanisms of these interactions. My goal is to protect humans from pathogens and contaminants circulating in our environment by harnessing microorganisms. I strive to translate my research findings into biological engineered applications that will meet the emerging challenges caused by infectious diseases.

Education

2017 – 2021 **Ph.D. in Civil and Environmental Engineering, EPFL**
Toward biocontrol of waterborne pathogens: contributions of protists to virus removal and associated mechanisms
Adviser: Prof. T. Kohn (EPFL, CH)
Specialization in Environmental Virology

2011 – 2016 **M.Sc. in Environmental Sciences and Engineering, EPFL and IHE**
Comparing the SDI, $MFI_{0.45}$ and MFI-UF methods to assess particulate fouling potential is reverse osmosis systems
Advisers: Prof. U. von Gunten (EPFL/Eawag, CH), Prof. S. Salinas (IHE, NL)

Research experience

01/2024 – Present **Postdoctoral researcher, Duke University**
Presistence of respiratory viruses
PI: Dr. Nicole Rockey (Duke, US)

03/2023 – 06/2023 **Visiting researcher, HUG**
Human microbiota analysis by a molecular approach
Genomic Research Laboratory, Division of Infectious Diseases
Adviser: Dr. Prof. J. Schrenzel (HUG, CH)
Contributing to sequencing libraries and state-of-the-art wet-lab metagenomics experiments, acquiring expertise in bioinformatics.

01/2022 – 02/2023 **Postdoctoral researcher, Eawag**
LeCo: Legionella Control in buildings
Department Environmental Microbiology
Adviser: Dr. F. Hammes (Eawag, CH)
Contributed to the LeCo team efforts in developing cutting-edge molecular biology methods for *Legionella pneumophila* and *Acanthamoebae castellanii* quantification, while independently characterizing their host-pathogen interactions considering abiotic and biotic factors, as well as nutrient cycles.

2017 – 2018 **Co-founder, Waterdrop Vietnam**
Non-profit organization pursuing a scientific mission
Field management of an international team of 20 research assistants and volunteers to conduct an assessment of water needs in Mekong Delta remote areas through inhabitant interviews and water characterization, with the support of Prof. B. Thanh (CARE/HCMUT, VN).

02/2016 – 07/2016 **Visiting master thesis student, IHE**
Comparing the SDI, $MFI_{0.45}$ and MFI-UF methods to assess particulate fouling potential is reverse osmosis systems
Water Supply Engineering
Advisers: Prof. U. von Gunten (EPFL/Eawag, CH), Prof. S. Salinas (IHE, NL)
Performed comparative measurements of reverse osmosis membrane fouling, resulting in a database of seawater parameters with an emphasis on algal growth periods available to researchers and industrial.

07/2015 – 11/2015 **Research engineer intern, CARE and HCMUT**
H_2O hospital project
CARE, Ho Chi Minh City (Vietnam)
Advisers: Prof. F. de Alencastro (EPFL, CH), Prof. B. Thanh (CARE/HCMUT, VN) and Dr. K. B. Schönenberger (EssentialTech Centre, CH)
Collected water samples in Vietnamese district hospitals and characterized their physicochemical and bacteriological quality to inform local stakeholders. Elaborated a research protocol for the implementation of water purification kits. This work was supported by the Network of Excellence in Engineering Sciences of the French-speaking Community (RESCIF) and was appraised by the EPFL Cooperation and Development Centre.

Peer-reviewed publications

[1] **Olive, M.**, Daraspe, J., Genoud, C., and Kohn, T. 2023. "Uptake without inactivation of human adenovirus type 2 by *Tetrahymena pyriformis* ciliates". en. In: *Environmental Science: Processes & Impacts*. ISSN: 2050-7887, 2050-7895. DOI: 10.1039/D3EM00116D.

[2] **Olive, M.**, Moerman, F., Fernandez-Cassi, X., Altermatt, F., and Kohn, T. 2022. "Removal of Waterborne Viruses by *Tetrahymena pyriformis* Is Virus-Specific and Coincides with Changes in Protist Swimming Speed". en. In: *Environmental Science & Technology* 56.7, pp. 4062–4070. ISSN: 0013-936X, 1520-5851. DOI: 10.1021/acs.est.1c05518.

[3] **Olive, M.**, Gan, C., Carratalà, A., and Kohn, T. 2020a. "Control of waterborne human viruses by indigenous bacteria and protists is influenced by temperature, virus type, and microbial species". In: *Applied and Environmental Microbiology* 86.3. DOI: 10.1128/AEM.01992-19.

[4] Ismail, N. S., **Olive, M.**, Fernandez-Cassi, X., Bachmann, V., and Kohn, T. 2020b. "Viral Transfer and Inactivation through Zooplankton Trophic Interactions". In: *Environmental Science and Technology* 54.15, pp. 9418–9426. DOI: 10.1021/acs.est.0c02545.

[5] Salinas Rodriguez, S., Sithole, N., Dhakal, N., **Olive, M.**, Schippers, J., and Kennedy, M. 2019. "Monitoring particulate fouling of North Sea water with SDI and new ASTM MFI0.45 test". In: *Desalination* 454. DOI: 10.1016/j.desal.2018.12.006.

Under review

- Margot C., Rhoads, W., Gabrielli, M., **Olive, M.**, Hammes, F. 2024, "A reactor for the production of *Legionella pneumophila* – containing biofilms".

Peer-reviewed conferences

2022 *Mechanisms of waterborne virus removal by protists*
Swiss Society for Microbiology - Annual congress, Lausanne (CH)

2022 *Mechanisms of waterborne virus removal by ciliates: toward biocontrol of viral pathogens?*
7th Food and Environmental Virology Conference, Santiago de Compostela (ES)

2021 *Harnessing protists for the control of waterborne human viruses in wastewater*
Poster, 5th International Conference on Eco-Technologies for Wastewater Treatment, Milano (IT)

2019 *Microorganisms from surface waters contribute to the decay of human echovirus 11: toward biocontrol of viral pathogens?*
Poster, 20th International Symposium on Health Related Water Microbiology, Vienna (AT)

2017 *Applying the new $MFI_{0.45}$ method and SDI in monitoring of seawater*
Co-author, IDA World Congress on Water Reuse and Desalination, São Paulo (BR)

Technical skills

- **Virology:** propagation of mammalian viruses and phages (MHV, RoV...), infectivity assays, monitoring of inactivation kinetics, UV disinfection, virus isolation (ultrafiltration, ultracentrifugation, skimmed-milk flocculation), virus purification
- **Culturing techniques:** various BSL2 bacteria including *Legionella pneumophila, Streptococcus pyogenes and Pseudomonas aeruginosa*; mammalian cells (BGMK, A549..)
- **Molecular biology:** DNA/RNA extraction, purification, PCR (16s, 18s), (RT)qPCR, ddPCR,bioanalyzer, gel electrophoresis, Next generation sequencing (Illumina, Iseq)
- **Protistology:** isolation from the environment, maintenance of axenic cultures, quantification, identification
- **Field-work:** routine sampling workflow from surface waters, drinking-water and wastewater treatment plants
- **Host-pathogen systems:** co-infection and co-culture assays for amoebae-Legionella
- **Microbiology:** biofilm analysis, biological removal of viral contaminant measurement, proteolytic enzyme activity assay, virus recovery
- **Flow cytometry:** TCC, ICC, method development for cell state differentiation (for instance, amoebae cysts, pseudocysts, trophozoites)
- **Imaging methods:** Transmission Electron Microscopy, trained in sample observation and image acquisition, epifluorescence
- **Microfluidics:** Basic training
- **Programming:** R, Matlab
- **Bioinformatics**: amplicon-based and basic metagenomics

Invited talks

01/02/2024 *The Protist Paradox - Departmental Seminar*
Environmental and Occupational Health Sciences, University of Washington (US)

28/09/2023 *Autumn biology seminar series*
Mitchell's lab, UniNE (CH)

14/06/2023 *Dual role of protist communities in waterborne pathogen regulation*
Mitri lab, UNIL (CH)

20/07/2023 *Eukaryotes as modulators of bacterial virulence genes and virus infectivity*
Sanitary engineering talk
TU Delft (NL)

29/11/2022 *Protists as modulators of waterborne pathogen persistence*
Environmental microbiology seminar series
Eawag (CH)

08/15/2017 *Waterdrop presentation to the Centre Asiatique de Recherche sur l'Eau (CARE/RESCIF)*
HCMUT (VN)

08/2015 *Water quality monitoring in Vietnamese district hospitals*
HCMUT (VN)

Awards and honors

2019 20th International Symposium on Health Related Water Microbiology **Best Poster Award**, Vienna (AT)

2017 Social Impact Award (SIA) Switzerland finalist for **Waterdrop Vietnam**, Geneva (CH)

Funding

2021 – 2022 Fix the Leaky Pipeline program, ETH domain (CH)
- Peer-mentoring and career-building for young female scientists
- Co-lead of a proposal
- Granted 5 000 CHF for mentoring and training

2017 Social Impact Award, Geneva (CH)
- Waterdrop
- Wrote and submitted the proposal
- Granted 20 000 CHF eq.

2015 Ingénieurs du Monde, EPFL (CH)
- H_20 Hospital
- Co-wrote and submitted the proposal
- Granted 1 500 CHF to conduct research in Vietnam

Student supervision

2021 Arnaud van Mesdag, M.Sc. student, EPFL (CH): summer project
Experimental investigation of protist impact on virus removal in activated sludge.

2021	Esther Schott, M.Sc. student, DTU (DK): semester project Nutrient availability in water and wastewater.
2020	Kang Fu, Runke Zhou and Shanci Li, M.Sc. students, EPFL (CH): semester project Neural-network-based automatic detection of viral particles in Transmission Electron Microscopy (TEM) images.
2019	Kuan-Po Liao, M.Sc. student, TU Munich (DE): semester project Investigation of the correlation between enzymatic activity and viral inactivation in water.
2018	Anna Lindsay, B.Sc. student, John Hopkins University (US): summer project Design of qPCR assasy to detect picornaviruses from lake water samples collected at different depths.
2018	Léna Bonin, B.Sc. student, EPFL (CH): semester project Water-related health risk assessment in the Mekong Delta and case-study (Duyen Hai, Tra Vinh province).

Teaching

2022	Preparation and animation of several journal clubs related to Legionella (Dr. F. Hammes)
2017 – 2021	Teaching assistant for ENV-507: Fate and Behaviour of Environmental Contaminants (Prof. T. Kohn)
2017 – 2021	Teaching assistant for ENV-200: Environmental Chemistry (Prof. T. Kohn and Prof. U. von Gunten)
2017 – 2021	Teaching assistant for Mise À Niveau (MAN) (Prof. S. Friedli)

Training activities

- Agile project management, Lausanne (CH), September 2023
- Amplicon-based sequencing with Illumina - training, ETH (CH), Summer 2022
- 2nd Symposium "Understanding Emerging Viral Diseases and Their Public Health Impact", Geneva Centre for Emerging Viral Diseases Campus Biotech, Geneva (CH), Apr. 5th-12th 2019
- "Practical Holotomographic Microscopy for Live Cell Imaging" summer school, Nanolive (CH), Aug. 2018