

The Chancellor of Ghent University has the honour of inviting you to attend the public defence of the doctoral dissertation of

Ruben Props

Title of the doctoral dissertation:

Microbial population and community dynamics in natural and managed freshwater systems: from methodology development to mechanistic insights

The public defence will take place on **October 15th 2018** at **17:00** at the August Vermeyleen room of "Het Pand", Onderbergen 1, 9000 Gent.

There will be a contiguous reception to which you are heartily invited.
Please confirm your attendance before **September 28th** to: **Ruben.Props@UGent.be**

Dissertation supervisors

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Dr. ir. Pieter MONSIEURS
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Board of examiners

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Chairman
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Abstract of the doctoral research

Freshwater ecosystems are hotspots of biodiversity, biogeochemical processes, and provide numerous societal services (e.g., drinking water production, wastewater treatment). The microbial communities that inhabit these systems form complex networks of interacting populations, for which the structure and function are not yet fully understood. This PhD research presents new insights into the microbial community ecology of both natural (i.e., lakes) and managed (i.e., cooling and drinking water) freshwater systems by developing and validating new technologies to study them and by investigating the genomic adaptations to their freshwater habitat.

A novel flow cytometric fingerprinting method for measuring microbial diversity was developed that correlated strongly with the benchmark marker gene sequencing approach typically used in diversity surveys. This new approach was applied in the monitoring of cooling water systems, the detection of microbial disturbances in drinking water, and the tracking of lake microbial diversity during exposure to invasive species. In parallel, the genomic adaptations of the prevalent microbial populations which shape the diversity in these managed and natural freshwater communities were investigated. We found that positive selection on nutrient scavenging genes and morphological plasticity may be adaptations to phosphate-limited environments commonly found in managed systems. In natural freshwater systems, our results indicated that small genetic or expression differences between populations can facilitate adaptation to steep temperature gradients, while larger genetic and expression differences underpin adaptation to nutrient gradients.

Brief Curriculum Vitae

Ruben Props (°Dendermonde, Belgium, November 8th 1990) graduated from University College Ghent with a Master of Science in Industrial Engineering (Biochemistry) in 2012 and graduated from Ghent University with a Master of Science in Bioscience Engineering (Environmental Technology) in 2014. He then pursued a collaborative PhD project between the Belgian Nuclear Research Centre (SCK•CEN) and the Center for Microbial Ecology and Technology (CMET) with the aim of developing new methodologies for studying freshwater microbial communities. Ruben spent one year at Vincent Deneff's research group at the University of Michigan to study the genomic adaptations of bacterial populations in the Laurentian Great Lakes.

During his PhD, Ruben successfully (co-)mentored five undergraduate students during their internships or dissertation research projects. He disseminated his research at eight (inter-)national conferences. He is author of four and co-author of 12 internationally peer-reviewed journal articles. He has acted as reviewer for nine manuscripts across seven interdisciplinary journals in his research field. Ruben received a Sofina Gustave-Boël fellowship of the Belgian American Educational Foundation (BAEF) to spend a year-long research visit at the University of Michigan (USA).