

## Session: Biofilm ecology and ecotoxicology

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### **Impact of wastewater microorganisms on the microbial communities of stream biofilms and their sensitivity to micropollutants**

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Effluents from wastewater treatment plants contain complex mixtures of micropollutants and are of major concern regarding their impacts on the quality of receiving streams. Stream periphyton, a complex community composed of bacteria, algae, fungi and protozoa, plays a crucial role in ecosystem functioning. It has been shown that periphyton tolerance towards micropollutants was increased upon *in-situ* exposure to wastewater. The aim of this study was to determine the role of microorganisms from wastewater effluents in the observed increased tolerance.

To achieve this goal, we grew periphyton during 4 weeks in flow-through channels that were continuously alimented with stream water that was mixed with various fractions of filtered or unfiltered treated urban wastewater. Filtration was meant to remove microorganisms while dissolved nutrients and micropollutants remain unaffected. Tolerance of periphyton to a micropollutant mixture extracted from passive samplers that were immersed in the effluent was determined via short-term bioassays. Impact of wastewater on microbial communities of periphyton was also assessed via sequencing of 16S and 18S rRNA genes in periphyton and compared to stream and wastewater communities. Moreover, 51 micropollutants were analysed in water and periphyton samples.

Our results show an increased tolerance for periphyton exposed to unfiltered wastewater, but not to the filtered one. Hence, the removal of ~99% microorganisms from the effluent led to the loss of increased tolerance. Effluent filtration also led to differences in the diversity and composition of periphyton communities compared to the control (without wastewater) and to the communities exposed to unfiltered wastewater. Moreover, the relative contribution of wastewater bacterial communities in periphyton was higher than that of stream communities, especially for periphyton exposed to unfiltered wastewater. These results suggest that microbes originating from the wastewater may have contributed to the increased tolerance, either directly via the colonisation of periphyton by micropollutant-tolerant taxa, or indirectly by modifying species interactions within the community.

Overall, our study highlights the need to consider the role of wastewater microorganisms, in addition to in-stream exposure of periphyton to micropollutants, in order to better understand potential impacts on the receiving water bodies.