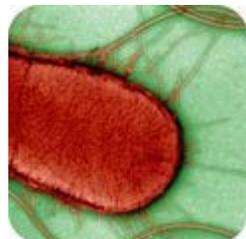




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Tracking Fecal Contamination in Water Using Biochemical Fingerprinting

Water reclamation is one method in which wastewater from private and community facilities is treated and chemically disinfected for safe use in the environment, thus reducing the use of drinking water in ecological and urban activities. To ensure the safety of these resources, microbial load and quality must be strictly regulated and controlled.

In a recent study by Casanovas-Massana and Blanch, the Phene-Plate System™ (Bactus AB, Stockholm, Sweden) was used to track the origin of fecal contamination in a reclaimed water open-air pond and to establish if the presence of fecal bacteria was due to regrowth following disinfection treatment or from an alternative origin ... [Read more >>](#)

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Throughout the world, water resources are required to sustain human life and support various agricultural, industrial, private, commercial, and environmental necessities. However, with the need for water increasing every year and the potential for water shortages, the optimization and management of potable water resources has become a primary concern for many societies¹.

Water reclamation is one method in which wastewater from private and community facilities is treated and chemically disinfected for safe use in the environment, thus reducing the use of drinking water in ecological and urban activities². In order for this treated water to be safely used, the microbial load and quality must be strictly regulated and controlled. This is of particular importance in reclaimed water open-air ponds, which are frequently subject to bacterial contamination originating from wildlife excrement.

In order to track and prevent fecal contamination of reclaimed water sources, microbial populations from human and animal sources can be tracked and distinguished using various analyses including ribotyping, DNA sequencing, amplified fragment length polymorphism, or denaturing gel electrophoresis. Though there are many advantages to each of these techniques, specificity and reproducibility can be compromised when analyzing samples containing very low levels of fecal bacteria³.

An alternative method for tracking low levels of fecal contamination is through biochemical fingerprinting. In a recent study by Casanovas-Massana and Blanch⁴, the Phene-Plate System™ (Bactus AB, Stockholm, Sweden) was used to track the origin of fecal contamination in a reclaimed water open-air pond and to establish if the presence of fecal bacteria was due to regrowth following disinfection treatment or from an alternative origin. In this

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study, 350 enterococcal strains and 308 fecal coliform strains were isolated and biochemically phenotyped along with two strains of *Escherichia coli* (ATCC® 700609™ and 23724™), which were used as internal controls to confirm assay reproducibility.

From this form of analysis, the group was able to determine that the origin of the fecal contamination was unrelated to the filtration and disinfection treatment of the reclaimed water. Rather, water quality was diminished due to surrounding wildlife activity. Overall, biochemical fingerprinting proved to be a successful approach in determining the source of fecal contamination within water samples as well as analyzing the quality of reclaimed water.

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1. United Nations Organization for water. Coping with water scarcity. Challenge of the 21st Century. UN-Water, Hamilton, 2007.
2. Levine AD, Asano T. Recovering sustainable water from waste-water. *Environ. Sci. Technol.* 38: 201A-208A, 2004.
3. Hagedorn et al. *Microbial source tracking: Methods, applications and case studies.* Springer, New York, 2011.
4. Casanovas-Massana A, Blanch AR. Determination of fecal contamination origin in reclaimed water open-air ponds using biochemical fingerprinting of enterococci and fecal coliforms. *Environ. Sci. Pollut. Res.* , Online Publication, 2012.



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