



HAL
open science

A pilot experimental installation to evaluate the efficiency of a pharmaceutical industry treatment plant and the resulting decrease in effluents toxicity to aquatic microbial biofilms

Vincent Tardy, C. Bonnineau, Agnes Bouchez, C. Rosy, B. Motte, Pascale Jeannin, Stéphane Pesce

► To cite this version:

Vincent Tardy, C. Bonnineau, Agnes Bouchez, C. Rosy, B. Motte, et al.. A pilot experimental installation to evaluate the efficiency of a pharmaceutical industry treatment plant and the resulting decrease in effluents toxicity to aquatic microbial biofilms. 1st International Conference on Microbial Ecotoxicology (EcotoxicoMic 2017), Nov 2017, Lyon, France. pp.1, 2017. hal-02606934

HAL Id: hal-02606934

<https://hal.inrae.fr/hal-02606934v1>

Submitted on 16 May 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



A pilot experimental installation to evaluate the efficiency of a pharmaceutical industry treatment plant and the resulting decrease in effluents toxicity to aquatic microbial biofilms

Vincent Tardy^{1*†}, Chloé Bonnineau¹, Agnès Bouchez², Christophe Rosy¹, Bernard Motte¹, Pierric Jeannin³, Stéphane Pesce¹

1. Irstea, UR MALY, 5 rue de la Doua, CS20244, 69625 Villeurbanne Cedex, France
 2. INRA UMR CARRETEL, 75 bis avenue de Corzent, CS 50511, 74203 Thonon les bains cedex, France
 3. SANOFI, Central Laboratory of Environment & Safety, Route d'Avignon, 30390 Aramon, France

Scientific context

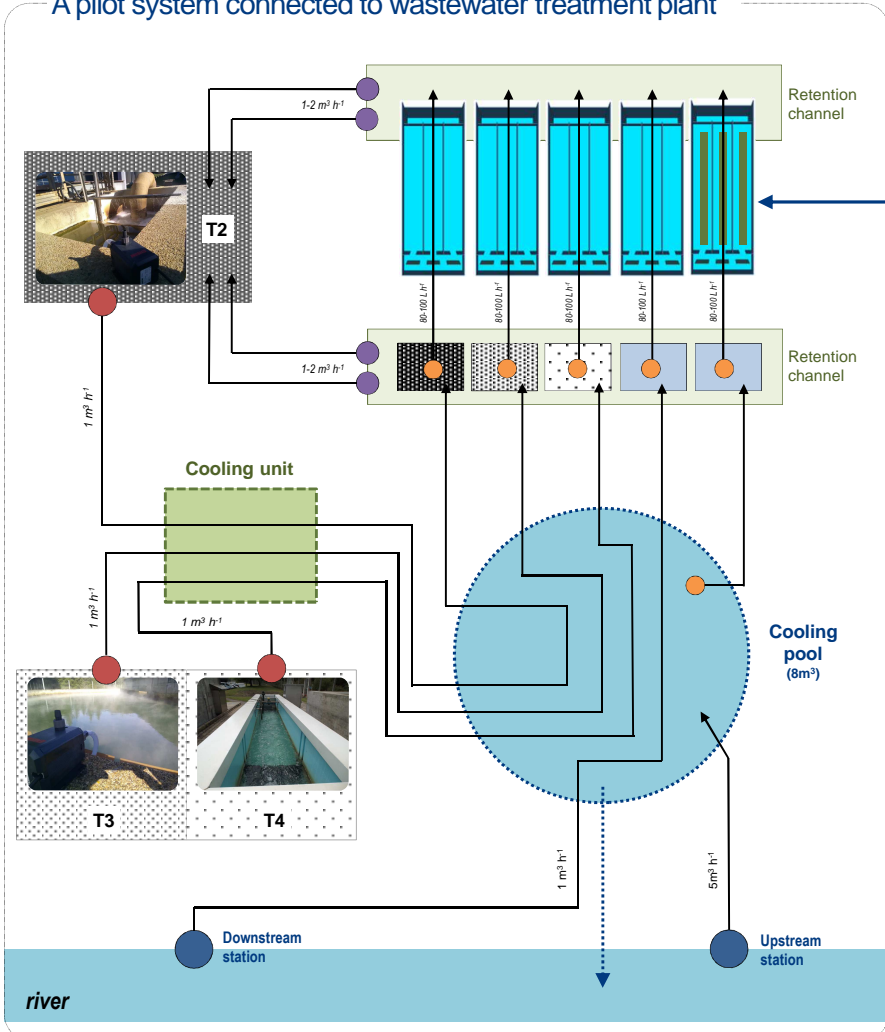
Pharmaceutical wastewaters are usually characterized as a complex mixture of chemicals with variable characteristics and compositions throughout the year. Accordingly, assessing the efficiency of industrial waste water treatment plants and the resulting decrease in effluent ecotoxicity and ecological impact throughout the treatment process remains very challenging. Microbial biofilms have been proven to be early warning natural assemblages to detect acute and long-term effects produced by chemical substances, including pharmaceuticals. Being composed of both autotrophic and heterotrophic microorganisms exhibiting a large range of sensitivity to many toxicants, biofilms are thus relevant models to assess environmental impacts of effluents by studying effects on microbial structure, diversity and functions.

In collaboration with SANOFI, we propose a pilot system to evaluate the decrease in acute and chronic toxicity of wastewater effluents on natural biofilm throughout the treatment process.

Sanofi Wastewater Treatment Unit

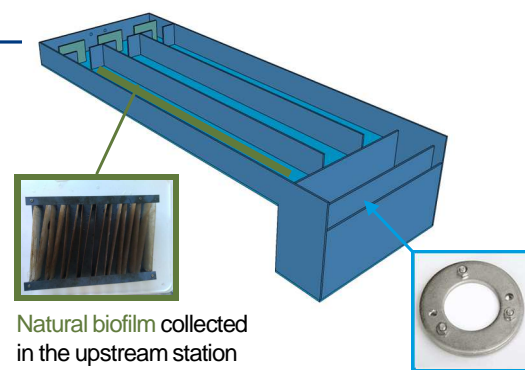


A pilot system connected to wastewater treatment plant



Experimental strategy...

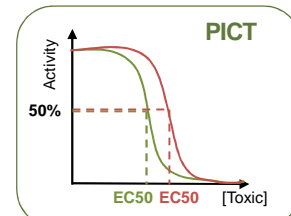
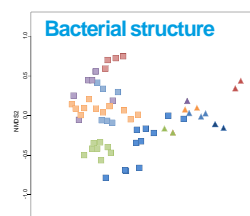
Artificial outdoor channel subdivided in three compartments to ensure replication



Natural biofilm collected in the upstream station

Passive samplers (Polar Organic Chemical Integrative Samplers, POCIS)

The chronic and acute toxicity of effluents on natural biofilms will be evaluated by combining structural and functional analysis as well as a pollution community tolerance (PICT) approach using pharmaceutical mixtures directly extracted from the passive samplers.



The system consists of five artificial channels continuously filled with wastewater collected after secondary (T2), tertiary (T3) and quaternary treatments (T4), respectively, as well as with stream water collected at the immediate upstream and downstream from the effluent discharge point in the river.