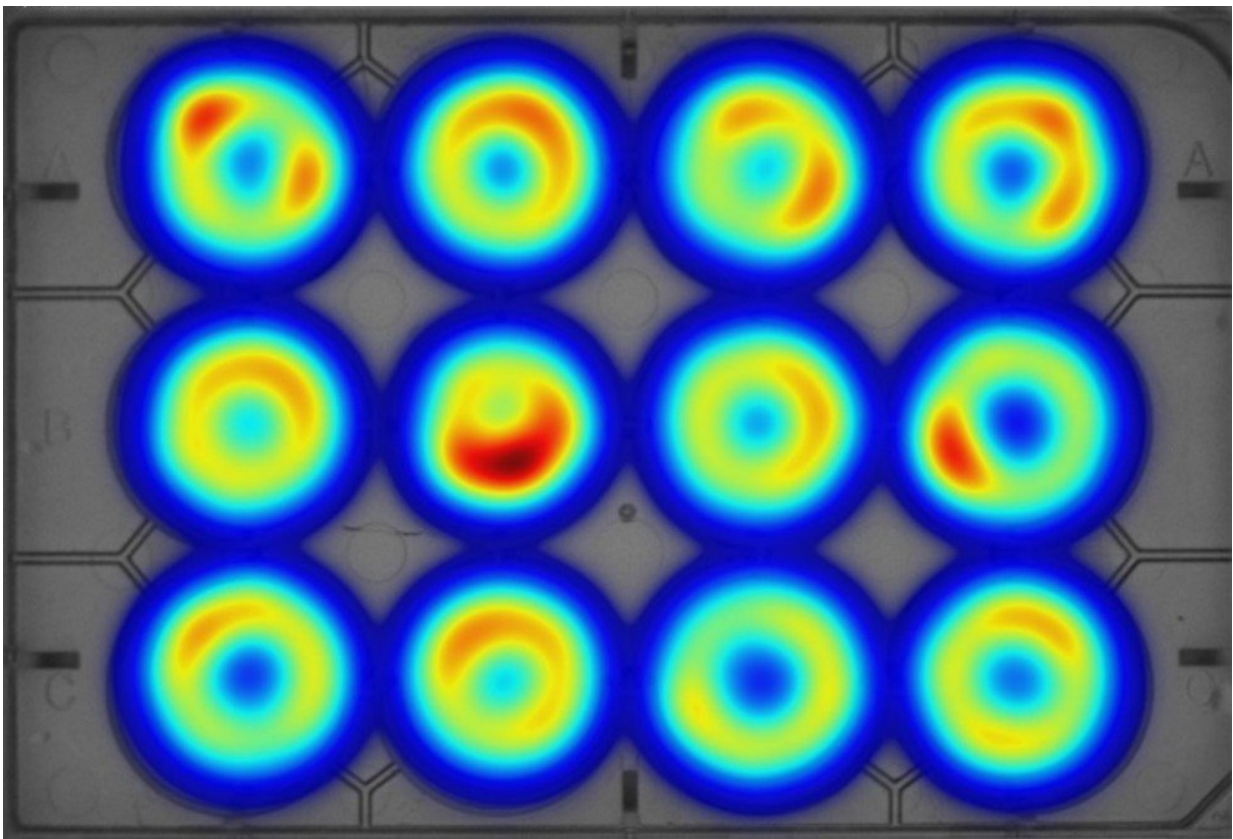


Fungicides and antidepressants in rivers alter the swimming and feeding behaviour of aquatic animals

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The species *Gammarus pulex*, common around the aquatic systems, reduces food intake and speeds up its swimming when in presence of toxins. Credit: Universidad de Barcelona

Surprisingly low concentrations of toxic chemical products in rivers including fungicides to antidepressants can change the swimming and feeding behaviours of some animals, according to a new research study led by experts from the University of Barcelona and the University of Portsmouth (United Kingdom).

The new study puts emphasis on the need to consider both low doses and mixed toxicity tests in the chemical risk evaluation of products that enter [aquatic ecosystems](#).

A cocktail of pollutants in rivers: a risk for life and health

It is known that in Europe, Asia, Australia and South America, water courses have high levels of fungicide compounds used in agricultural production. However, antidepressants are also found in urban rivers and marine freshwater environments. These chemical products get to the water environment and are not completely removed in [wastewater treatment plants](#); they can accumulate in some fish species' brains. Although toxicity tests for new chemicals are common, thus far, the effects of the combination of different toxins was not well known.

"Most world urban waterways receive a cocktail of pollutants from agriculture runoff and sewage systems with high drug concentrations," says Professor Alex Ford. "These cocktails might not kill marine species, but we are worried about the sub-lethal effects of some of these pollutants. There can be thousands of chemical products in our rivers and seas, and even though they might not be lethal, these pollutants can damage the aquatic ecosystems' health."

"These results show the importance of understanding and knowing about the impact of complex pollutant mixes. One of the big enigmas for

environmental toxicologists is how to determine or predict the effects of each combination of chemical products when thousands are released to the environment and many had a limited toxicity assessment," warns Ford.

The long journey of antidepressants and fungicides in the environment

In the study, researchers analysed the effect of an antidepressant and a fungicide in amphipods, shrimp-like crustaceans. Lecturer Isabel Muñoz from the University of Barcelona says, "This study shows the effects of these pollutants mixed and in low concentrations on the behaviour of the freshwater shrimp *Gammarus pulex*. This crustacean, common around aquatic systems, reduces food intake (leaf litter) and speeds up its swimming when in presence of toxins. Although effects are not lethal, they can be significant in the food web and the ecosystem functioning."

Professor Ford says, "What shocked us was to verify the effects on feed and swimming speed in amphipods, even at low pollution levels. The experiment with fungicides is interesting because many are used in agriculture and in our shampoos and lotions. In particular, freshwater shrimps prefer to eat leaf litter in river beds after those being occupied by fungus. In this situation, with all the fungicides in the water, leaves are less tasty to the amphipods, and they ate less. However, antidepressants also made them eat less, which is an effect we had not predicted."

"The study on swimming behaviour proved that animals swam faster after being exposed to fungicides and antidepressants. However, when they were exposed to both elements, as usually happens in the natural environment, the cocktail made them swim slower. The alteration of swimming or feeding behaviours can have important effects on growth,

breeding and survival of these creatures which are important in the food chain." Previously, other studies by Professor Ford had showed that antidepressants made small crustaceans to swim for a longer time to increase their predation chances.

"The way in which an animal eats and moves is a sensitive indicator to detect the sub-lethal impact on organisms that are probably important in other areas of the food chain and our ecosystem," warn the authors.

More information: N. De Castro-Català et al. Evidence of low dose effects of the antidepressant fluoxetine and the fungicide prochloraz on the behavior of the keystone freshwater invertebrate *Gammarus pulex*, *Environmental Pollution* (2017). [DOI: 10.1016/j.envpol.2017.07.088](https://doi.org/10.1016/j.envpol.2017.07.088)

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