

OCCURRENCE AND TOXICITY OF ANTIBIOTICS IN THE AQUATIC ENVIRONMENT

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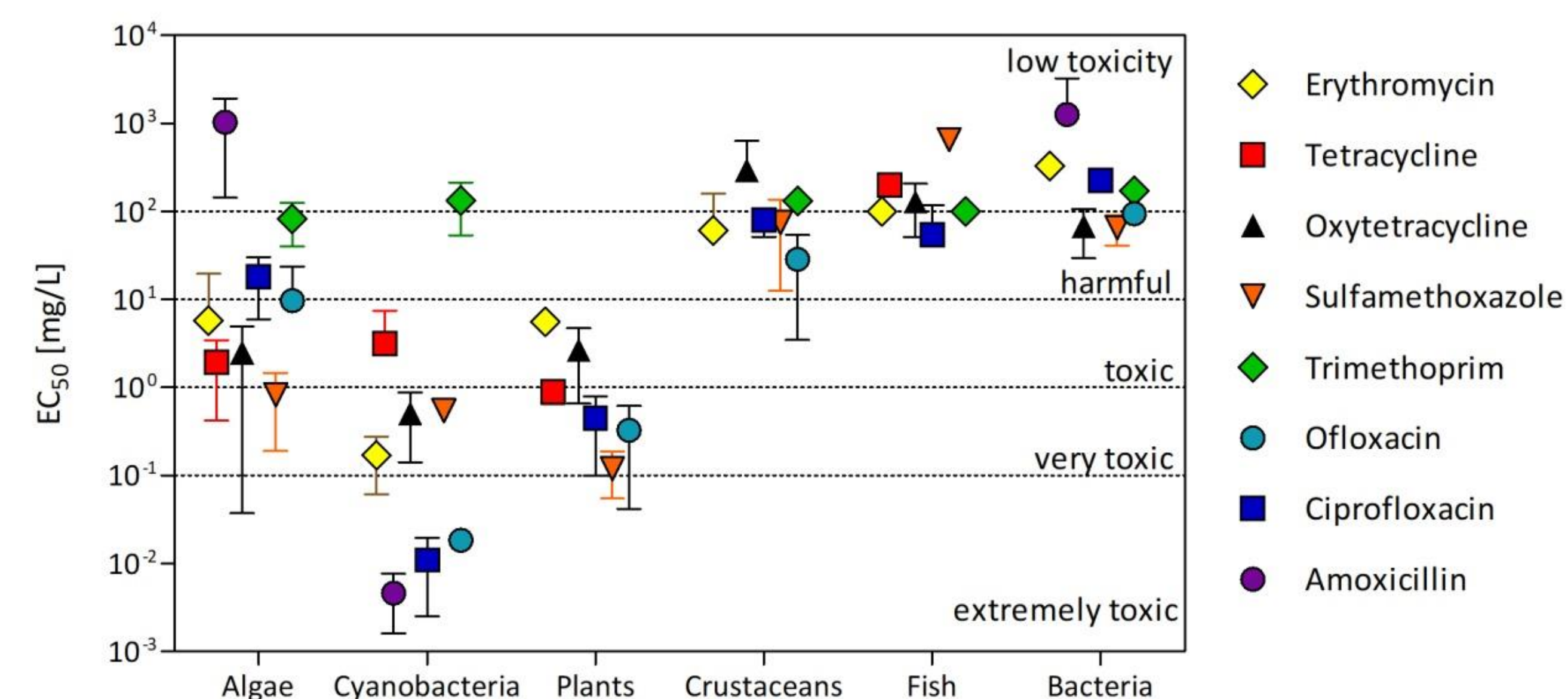
Introduction

Antibiotics (ATBs) are natural, synthetic or semi-synthetic compounds, which are able to kill or inhibit growth or metabolic activity of microorganisms. In recent years, ATBs have been used for human and animal disease treatment, growth promotion, and prophylaxis, and their consumption is rising worldwide. ATBs are often not fully metabolized by the body and are released into the aquatic environment, where they may have negative effects on the non-target species.

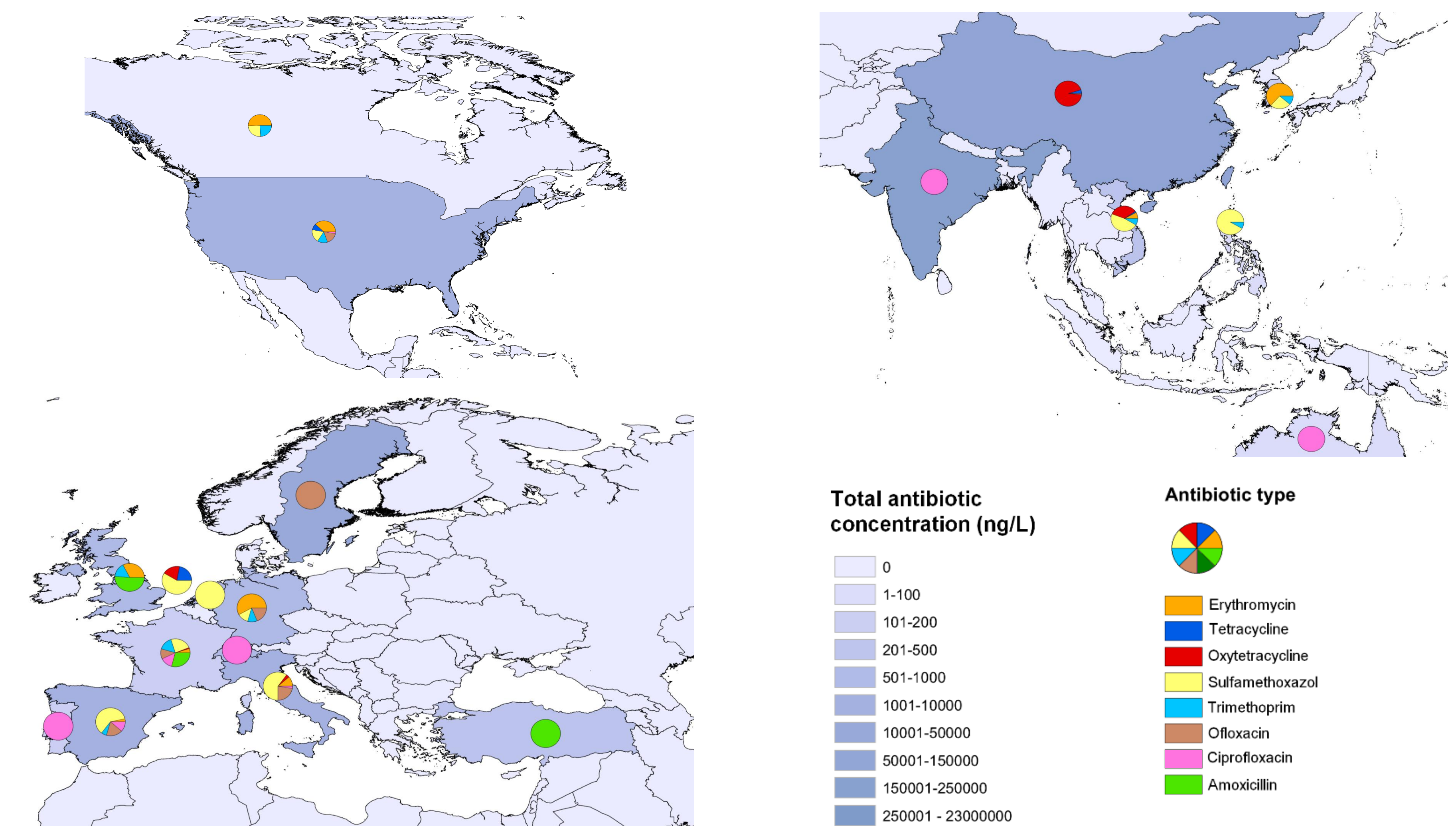
We examined the recent researches on eight ATBs from six different classes of the great concern based on their common use in human and veterinary medicine. A detailed overview of their concentrations in surface waters as well as ecotoxicity towards different groups of organisms is provided.

Ecotoxicological effects

ATBs induced relatively low acute toxicity in fish and invertebrates such as *H. attenuata*, *A. salina*, and *D. magna*. Cyanobacteria were proved as the most sensitive organisms (followed by green algae and plant *L. minor*) and have been proposed as the suitable organisms for testing of ATBs toxicity. Bacteria, ATBs target organisms, represented by *V. fischeri* in Microtox assay, showed low sensitivity to ATBs. The insensitivity is caused most likely by short exposure time, during which the mechanism of action of ATBs will not be demonstrated. The prolonged 24h test is therefore recommended.



Occurrence in surface water



Conclusion

ATBs are continuously discharged into the aquatic environment, where they may be found in the range of ng/L-mg/L. Especially some Asian countries showed relatively high mean concentrations of most of the discussed antibiotics, where China and India are important contributors in the region. At detected concentrations, ATBs are unlikely to elicit acute toxicity. However, the risk data indicate that they may pose a threat to aquatic environments. Primary producers and decomposers appear to be particularly susceptible to the adverse effects of ATBs, leading to potential distortions of the aquatic environment. Further studies on their chronic effects to aquatic organisms and the toxicity of antibiotic mixtures are necessary to fully understand the hazards these ATBs present.