# Microplastics increase the selective potential of antibiotics at sub-inhibitory concentrations

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Microplastics (MPs) are major pollutants that are massively released into the environment. In urban waters, biofilms can form on plastic surfaces and thus MP particles might affect environmental bacteria and their associated resistome. In addition, antibiotics may adsorb onto plastic surfaces and have a greater effect on plastic-associated bacteria than on planktonic bacteria. Therefore, the presence of MPs in the environment could pose a risk for antibiotic resistance development and dissemination in environmental settings. The goal of this study was to determine the impact of microplastics in combination with antibiotics on environmental bacterial growth and antibiotic resistance. We hypothesized that the presence of MPs could increase the selective potential of antibiotics at sub-inhibitory concentrations on environmental bacteria and their associated antibiotic resistance genes (ARGs). DNA was extracted from urban river bacteria enriched in TSB medium or sterile water over 72 hours, with and without microplastics and gentamicin and ciprofloxacin at sub-inhibitory concentrations. The 16S rRNA and gentamicin resistance genes were amplified by qPCR to determine pollutant effects on growth and ARG selection. In addition, the influence of MPs and antibiotics on river water communities was evaluated by sequencing the 16S rRNA gene. Bacterial abundance was lower in the MP fraction than in the liquid fraction (both with or without MPs). Antibiotics had no effect on bacterial abundance in any fraction and where thus overall sub-inhibitory. Bacterial exposure to both gentamicin and ciprofloxacin at sub-inhibitory concentrations induced a larger shift in baterial community composition in the MP fraction than in the liquid fraction (with or without MPs), with an increase in the relative abundance of *Citrobacter*, *Klebsiella* and *Pseudomonas*. Gentamicin and ciprofloxacin selected for gentamicin resistance genes in the MP fraction, both in TSB medium and in sterile water. Therefore, our results are consistent with antibiotics at sub-inhibitory concentrations having a larger impact on environmental antibiotic resistance in the presence of MPs. This study adds to the concerns related to the role of microplastic pollution on the emergence of antibiotic resistance in the environment.