

# Low antibiotic concentration in the environment enough to increase antimicrobial resistance in laboratory conditions

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Microbial communities are equipped with effective defence mechanisms against antibiotics. Existing antimicrobial resistance may become increasingly prevalent on its own – with no interference from antibiotics – in compact bacterial communities known as biofilms, or when protozoa hunt bacteria for food.

Increased antimicrobial resistance in [bacteria](#) has caused a global crisis in human health care. Strains of pathogenic bacteria resistant to all known [antibiotics](#) have been found. Antimicrobial resistance is a trait that can spread within a bacterial species or even across the species barrier. Resistance will expand and become increasingly prevalent when bacteria that survive in an environment containing antibiotics genetically pass on or otherwise distribute this trait to other bacteria.

Recent studies indicate that even weak antibiotic concentrations are sufficient to cause a rise in the prevalence of antimicrobial resistance in [bacterial populations](#) cultured in laboratory conditions. Such conditions are brought about when antibiotics used to treat both human and animal infections end up in sewage or elsewhere in the environment.

"However, it should be noted that in natural conditions bacteria are a part of multispecies communities and exist in interaction with viruses and protozoa that hunt for bacteria. That's why the matter requires more study," says Johannes Cairns, who defended his dissertation at the Faculty of Agriculture and Forestry, University of Helsinki, Finland.

Low antibiotic concentrations increased antimicrobial resistance in laboratory-cultured [microbial communities](#) equally well if not better compared to single species settings. Surprisingly, no antibiotics at all were necessary to see a rise in the prevalence of antimicrobial resistance.

"We found that [antimicrobial resistance](#) can also become more prevalent due to the presence of protozoa that prey on bacteria or in conditions

where the bacteria had settled on a surface as a biofilm, or a compact community," notes Cairns.

**More information:** Cairns, Johannes. Low antibiotic concentrations and resistance in microbial communities. Dissertation, University of Helsinki, Faculty of Agriculture and Forestry, Department of Microbiology. URN:ISBN:978-951-51-4371-6, [hdl.handle.net/10138/237141](https://hdl.handle.net/10138/237141)

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