

Dear Editor,

please find attached an article we would like to submit to the Journal of the Royal Society: Interface entitled “**Diffusion-driven enhancement of the antibiotic resistance selection window**”.

The purpose of our manuscript is to pose a spatially-explicit population dynamics model that allow us to study how antibiotic gradients drive drug-resistance dynamics of mixed bacterial populations. Our main result is that environments with high-degree of connectivity, maximize diffusion of antibiotics throughout the environment, maximally decreasing bacterial density but also increasing selection for resistant genotypes.

We validated this theoretical result using a bespoke experimental system to grow *Escherichia coli* in 3D-printed gradient devices. By fluorescently-tagging Kanamycin-resistant and susceptible strains, we were able to track the spatio-temporal distribution of both subpopulations in our device, confirming that increased diffusion of antibiotics positively correlates with the number of locations where resistance is selected for.

I hope you and your journal find this paper of some interest,

Yours truly,



**Ayari Fuentes-Hernandez, on behalf of all co-authors**

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