

METALHEAD CULTURE OR BACTERIAL CULTURE?

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Microbiologist by day.

Death metal guitarist by night.

Evolutionary microbiologist and musician Ville Friman is a unique figure in his field. Successfully balancing both his passions, Friman was granted a Professorship at the University of Helsinki in Summer 2022. Shortly after, he was celebrating the release of his band Insomnium's ninth studio album, *Anno 1696*, to international acclaim^{1,2}. At the time of writing, the group are touring North America, riding the high of *Anno 1696* charting #1 in their native Finland.

Still, Friman devotes the majority of his time to studying evolution on the scale of Petri dishes. Inherently short generation times of bacteria permit observation of evolutionary adaptation in real time. Preservation of ancestral cultures and comparison to extant samples enable genetic analysis to a degree unachievable with animals, highlighting the merit of such study. Friman has adopted a range of research interests in microbiology, spanning agricultural and medical contexts.

Firstly, his group studies the relationship between bacterial rhizosphere diversity and resistance to plant pathogenic invasion. In plants, the rhizosphere makes up the primary line of defence against invasive agents³. Evidence suggests that a more diverse rhizosphere provides greater protection, yet why this is the case is unknown. The Friman lab have found that in the case of invasive *R. solanacearum* bacteria, this is due to stronger competition with the pathogen for the same niche and direct antibacterial interactions^{3,4}. Further, initial environmental conditions and species composition of the rhizosphere impacts infectivity of the pathogen⁵⁻⁷.

Additionally, Friman and his group investigate the viability of phage therapy, the manipulation of bactericidal viruses, as an alternative to antibiotic treatment. The looming spectre of antibiotic resistance has encouraged research in alternative avenues of treatment, although the development of phage resistance promises a familiar headache. Utilising *R. solanacearum* for study in agricultural

contexts, Friman also uses *P. aeruginosa*, an opportunistic human pathogen, for study in clinical contexts. Friman's research proves that short-term phage therapy is optimised by bulk application of multiple phages⁸, thereby barring the serial acquisition of resistance mutations seen upon sequential application⁹. Pertinently, phage treatment also spares the bacterial rhizosphere¹⁰, highlighting its potential as a precision tool to target pathogenic microbiota.

Professor Friman is now in discussion with several companies to engineer a mechanism to store phages in powder or tablet form, such that they can be directly applied to farming irrigation systems. He also hopes that, clinically, his research ushers a new wave of phage therapy to stymie ever-growing antibiotic resistance.

Regarding Insomnium, following North America, planning is in progress for a European tour this autumn.

Metalhead culture or bacterial culture? For Ville Friman, it's both.

References

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