The ecology and evolution of microbial warfare in streptomyces

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STELLINGEN

behorende bij het proefschrift

The Ecology and Evolution of Microbial Warfare in *Streptomyces*

1. Antibiotics do not need to reach lethal concentrations to have pronounced effects on resistance evolution (this thesis, Chapter 3 and Gullberg *et al. PLoS Pathogens* 2001).

2. Spatially structured environments benefit the evolution of antibiotic producers (Chapter 4, this thesis).

3. Streptomycetes distinguish between competitors to fine tune their antibiotic production and are more likely to induce antibiotics in response to competing strains that share similar secondary metabolite clusters (this thesis, Chapter 5).

4. Volatile compounds are produced by *Streptomyces* in response to competition, among others to lure other species that transport spores to a more favourable environment (this thesis, Chapter 6 and Becher *et al. Nature Microbiology* 2020).

5. To understand the importance of antibiotics for the ecology of microbial communities, their effects should be estimated at small spatial scales and concentrations that reflect the competitive arena where these metabolites are used in Nature.

6. While studying isolated strains in laboratory conditions has led to many breakthroughs, it is essential to move towards studying microbial communities in more natural conditions.

7. Phenotypic screening paints a picture, transcriptomics tells a story.

8. Microbial ecology can borrow and adapt ecological theory that has been developed for animals and plants (based on Prosser *et al. Nat Rev Microbiol* 2007).

9. The current pandemic highlights that we cannot predict the next big threat to global health and confirms the need for fundamental research, even if the direct benefits may not always be obvious.

10. Stress might make *Streptomyces* more productive, but it is doubtful whether the same is true for PhD students.

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