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Poster #55: Dissecting antiviral defense systems in Actinobacteria –from single cells to the community level

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Viruses infecting bacteria, so-called bacteriophages (phages for short) account for the most abundant biological entity on the planet and pose a constant threat for bacteria. Due to that omnipresent evolutionary pressure, bacteria evolved complex "immune systems"with a great diversity of antiviral defense mechanisms, such as abortive infection (Abi), restriction modification (RM) systems or CRISPR-Cas. In recent years, chemical antiviral strategies on a community level, mediated by small molecules and secondary metabolites of Actinobacteria, came into the focus of attention.(1) There are indications that the antiviral immune defense of bacteria is not limited to single cells, but rather plays a communal role in the so-termed "pan-immune system" (2).

Previous studies revealed that defense systems often cluster within "defense islands". Based on these findings, bioinformatic prediction tools have been developed for the identification of new, yet uncharacterized defense systems. These tools show a particular bias toward Proteobacteria, and analysis across other bacterial phyla have revealed a notable "depletion"of so far known defense systems in other large phyla, such as the diverse phylum of Actinobacteria.(3) Here, we leveraged existing bioinformatics predicition tools to identify potential antiviral defense systems in the actinobacterial model strain *Corynebacterium glutamicum*. Using DefenseFinder and PADLOC, we identified overall 12 different systems with a putative role in antiviral defense.

Here, we investigate the role and potential co-regulation of selected defense systems during phage infection. Our initial screenings against a collection of 5 phages indicated that, in particular genomically-integrated (cryptic) prophages represent a hotspot for systems involved in antiviral defense.

Reference #1

Georjon, H. \textbackslash{}\& Bernheim, A. The highly diverse antiphage defence systems of bacteria. Nat

Reference #2

Bernheim, A. \textbackslash{}\& Sorek, R. The pan-immune system of bacteria: antiviral defence as a commun

Reference #3

Georjon, H., Tesson, F., Shomar, H. \textbackslash{}\& Bernheim, A. Genomic characterization of the antivi

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