Optimization of Violacein Biosynthesis for **Enhanced Antimicrobial Properties**

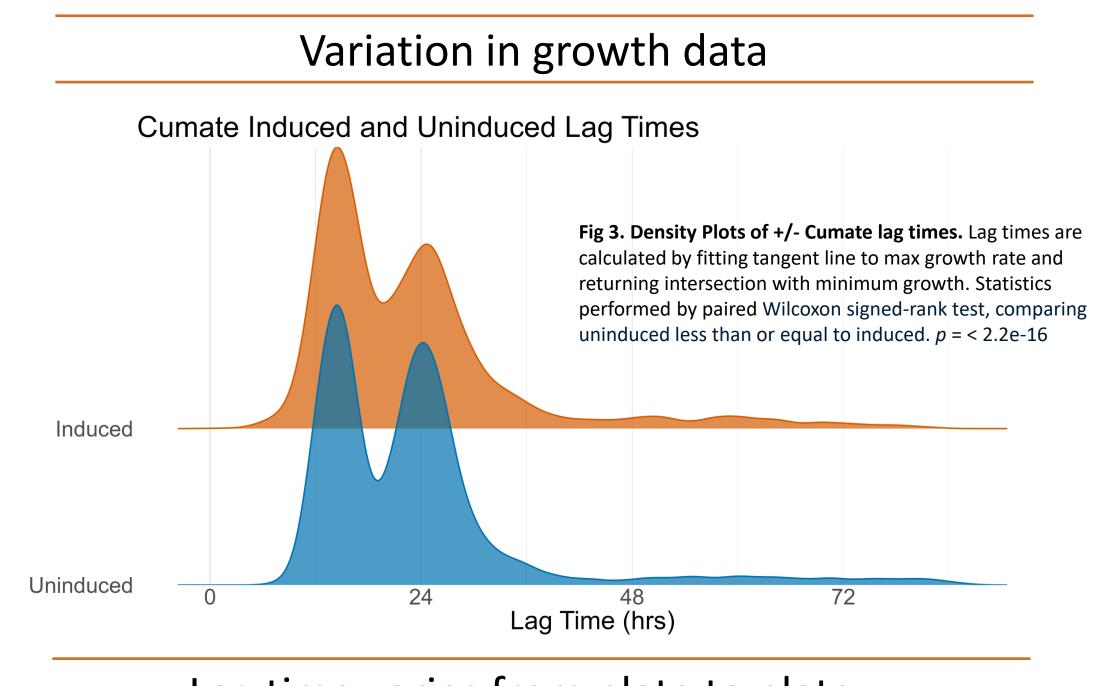
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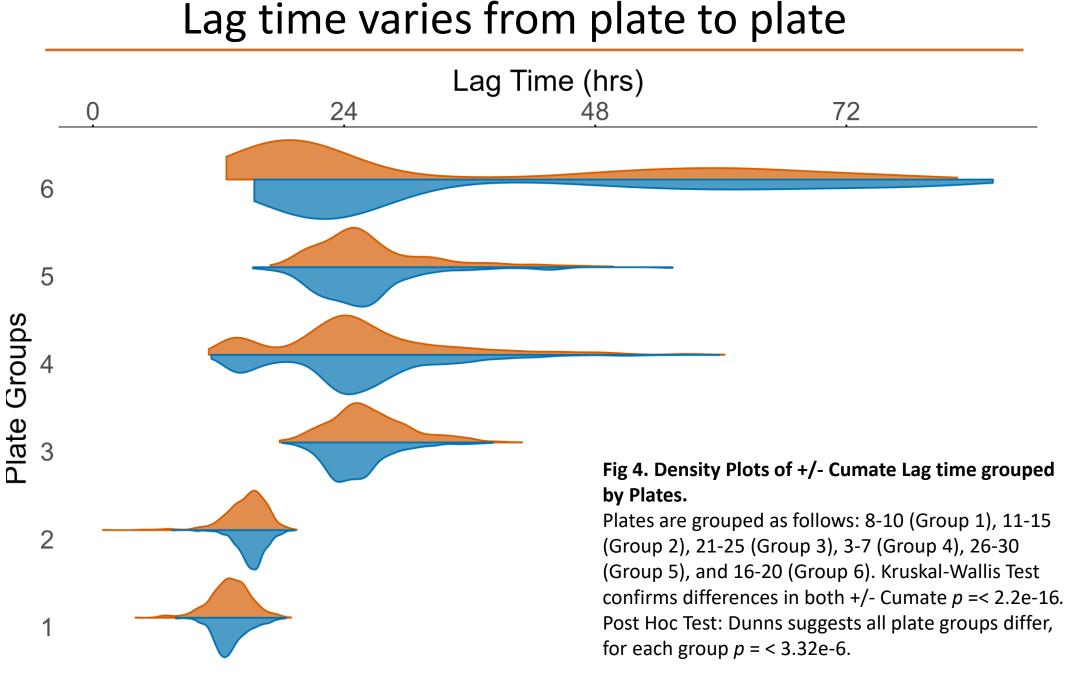
Background

Violacein is a purple pigmented bisindole with antimicrobial properties. The production of violacein is regulated by the vioABEDC genes. We hypothesize that different gene expression levels will affect the growth and antimicrobial properties of violacein. Being able to harness violacein and its antimicrobial properties could have benefits in gut health and soil science research.

Objective

Each sample presents a unique gene expression combination, allowing us to create a large genomic library. Testing the library against optical density and area of inhibition data we can further understand the link between genotype and phenotype.





Gene interaction has little affect on growth rate

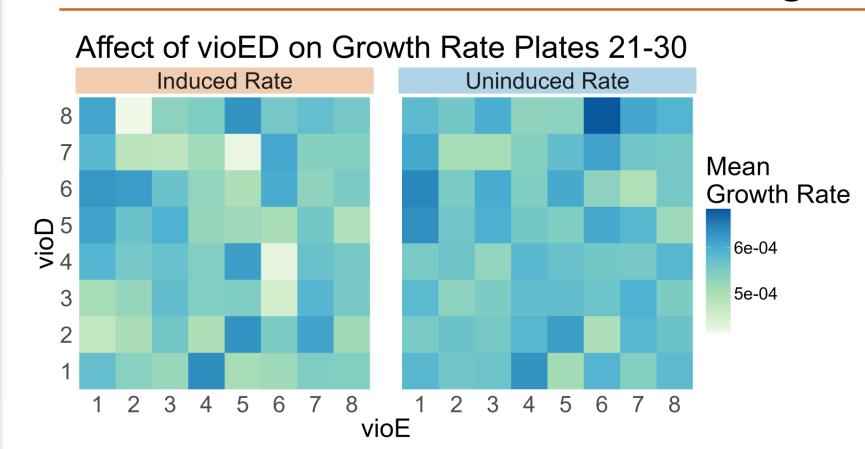


Fig 6. Heatmap of +/-**Cumate Exponential Growth Rate of vioED.** Interactions between vioED have little growth rate signal. Kruskal-Wallis test does not suggest differences either +/- Cumate p >= .1006.

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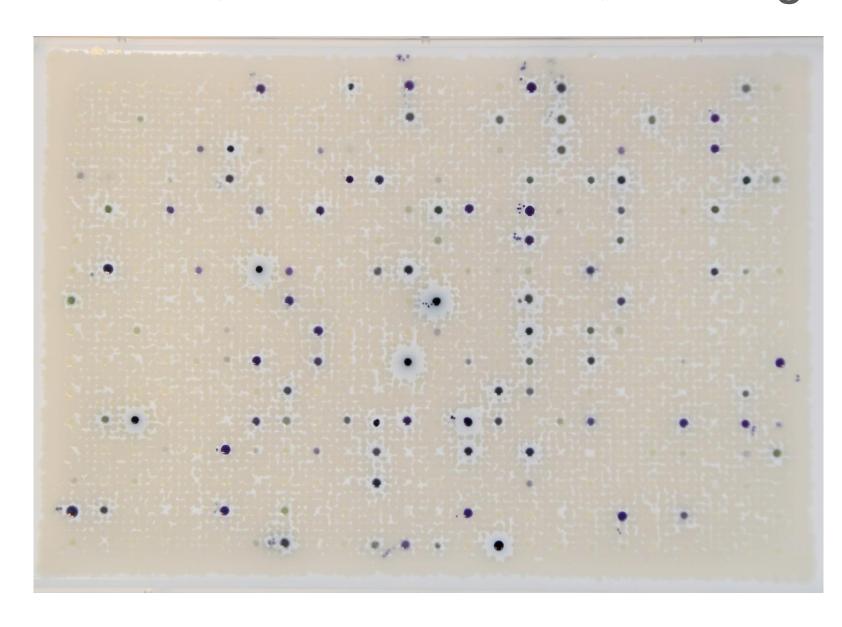
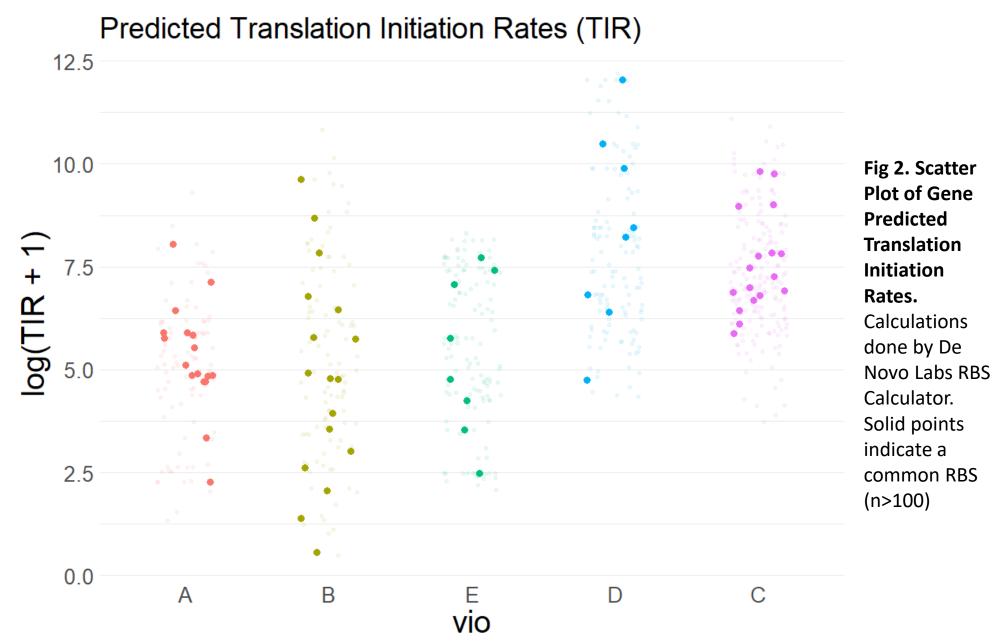


Fig 1. Top-Down View of 384 Well Agar Clearing Plate. E.Coli placed onto lawn of Bacillus Subtilis. Plates were incubated overnight at 37°C



No genes translation rate affects growth rate

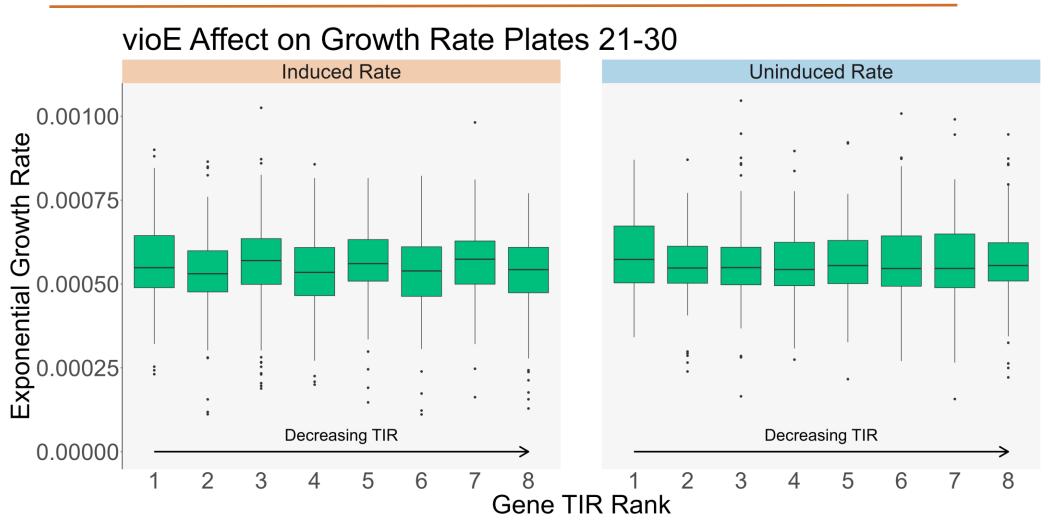


Fig 5. Boxplot of +/- Cumate Exponential Growth Rate of vioE. Exponential Growth rates calculated by parsing exponential region of optical density data and fitting 2 term exponential model (a $\cdot e^{rx}$). Kruskal-Wallis test showed no significant differences between TIR Ranks in either +/- Cumate $p \ge .2129$

Conclusion

- Variation in growth data potentially due to experimental errors
- Results suggest different gene expression have little effect on growth rate
 - Recultivate select colonies to confirm
- Work needed to find area of inhibition from clearing plates
- Further work in predicting ideal gene expression combination using machine learning

Acknowledgments

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