

Hunting for Tiamulin Resistance



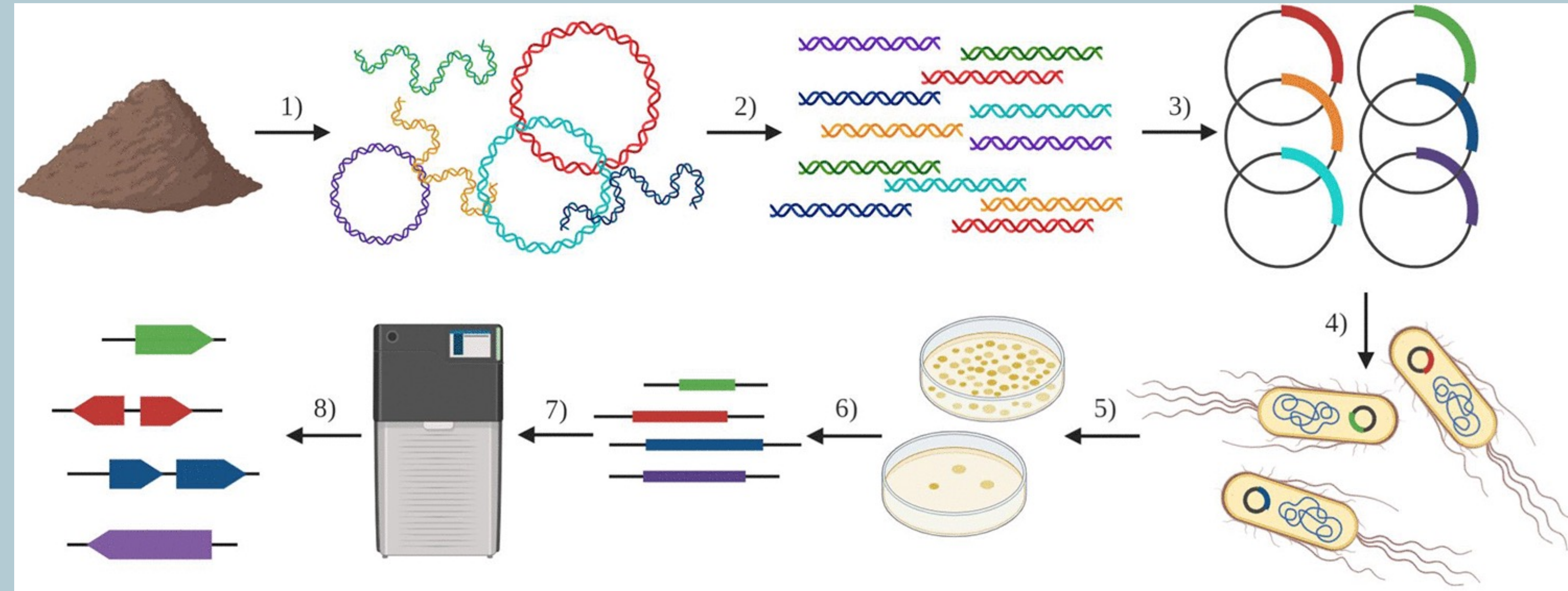
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Abstract

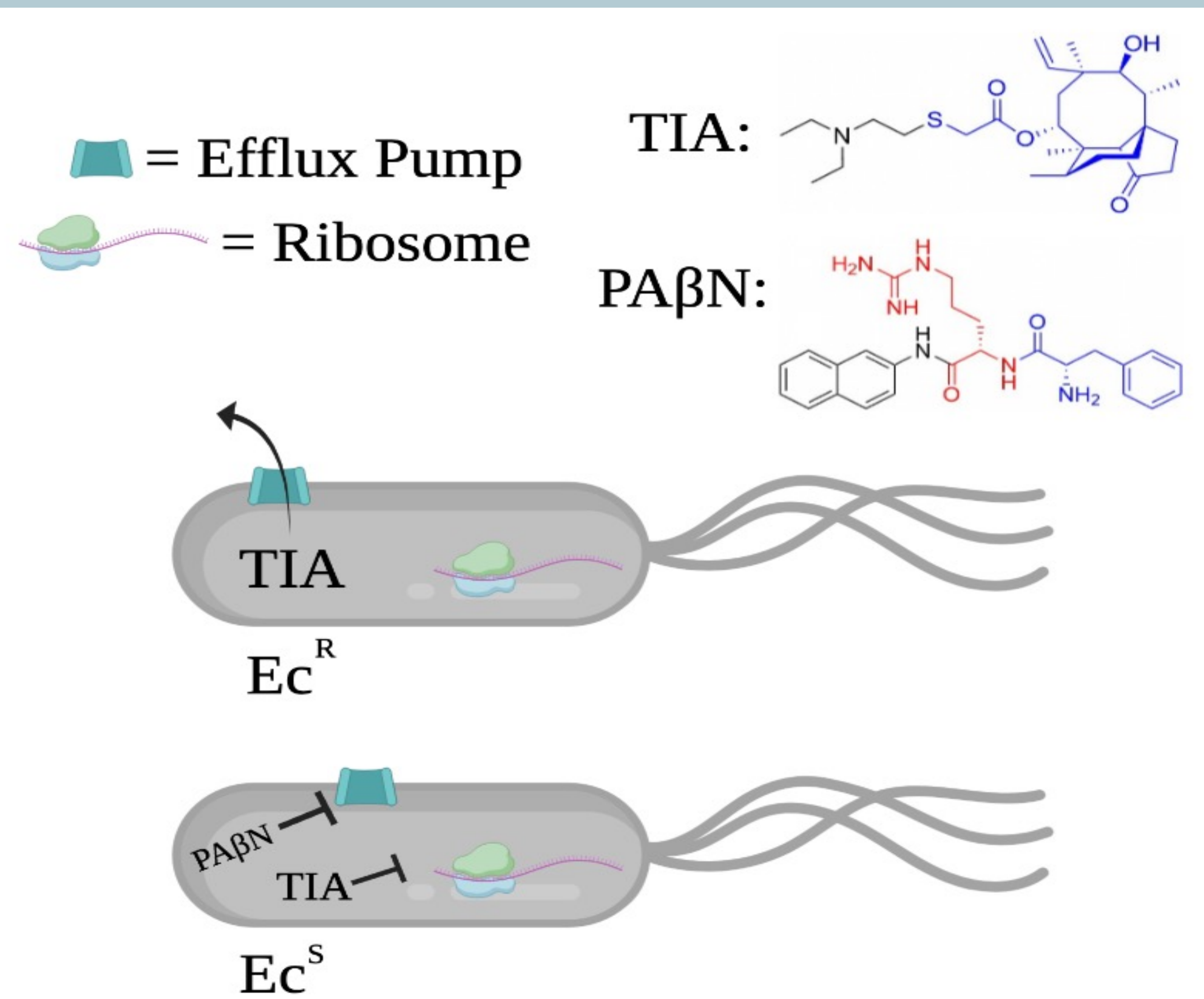
- Increase in antibiotic resistance over the past few decades.
- This study specifically investigates Tiamulin, an antibiotic from the pleuromutilin family.
- E. coli* isn't typically susceptible to Tiamulin, but given with an efflux pump inhibitor, *E. coli*'s growth stops.
- A functional metagenomic selection and sequencing of resistant colonies gave resistance.
- The goal in this study is to find resistance genes, clone them, and measure *E. coli* tiamulin resistance.

Methods

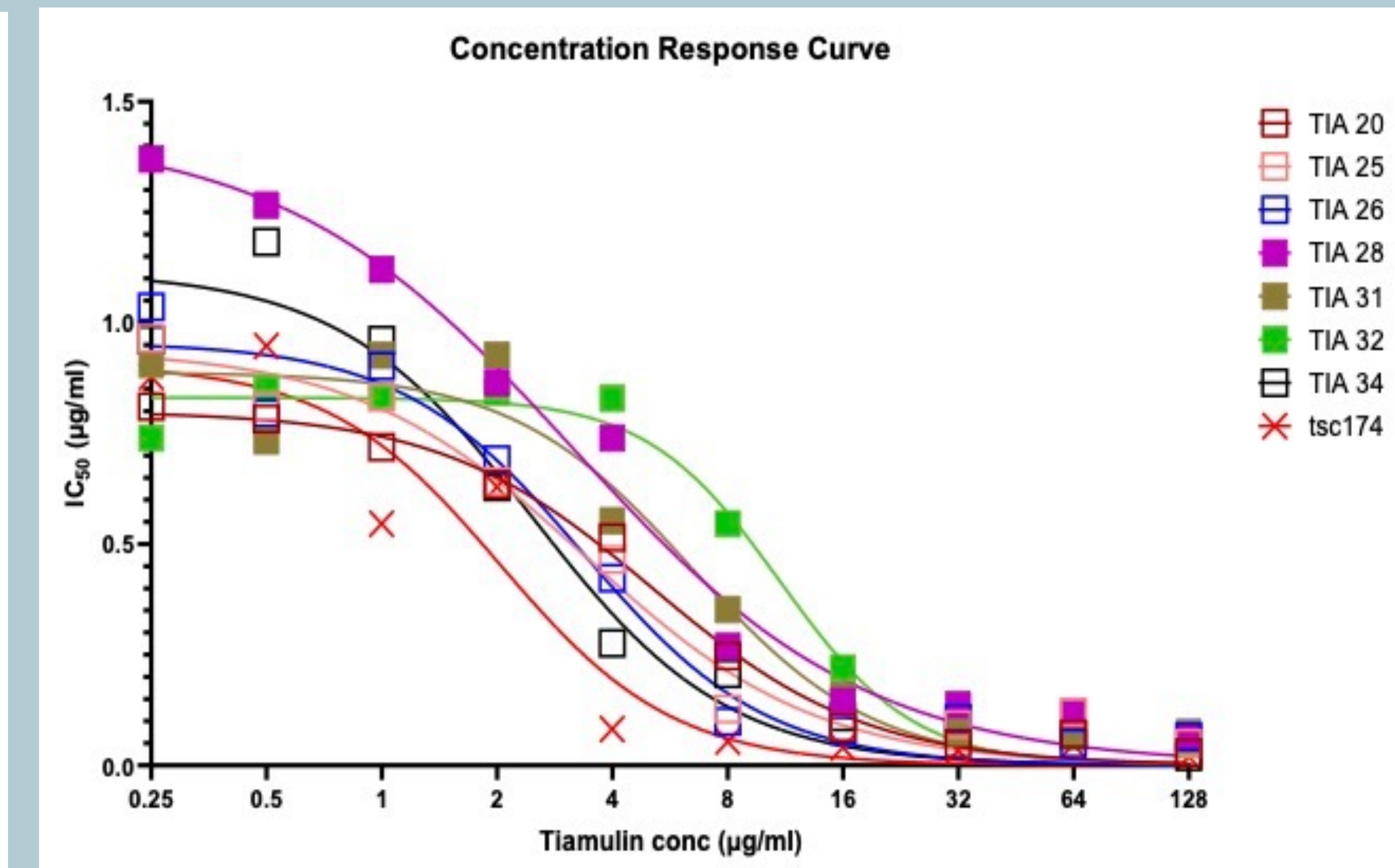
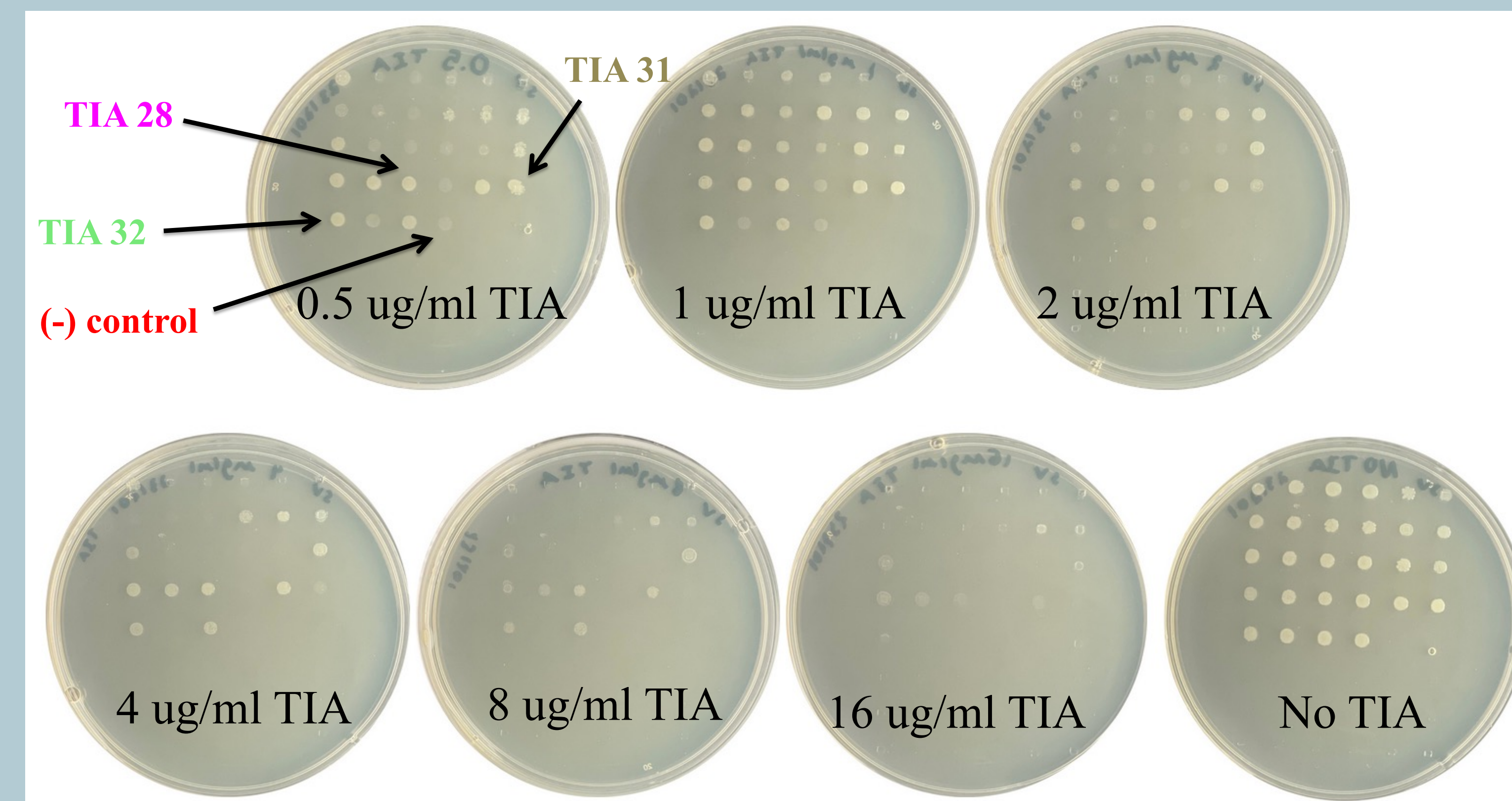


- The eight steps that form the functional metagenomic pipeline.
- Starting with DNA extraction from the soil microbiome, all the way to sequencing and then the annotation of those sequences.

How Tiamulin and PAβN work:



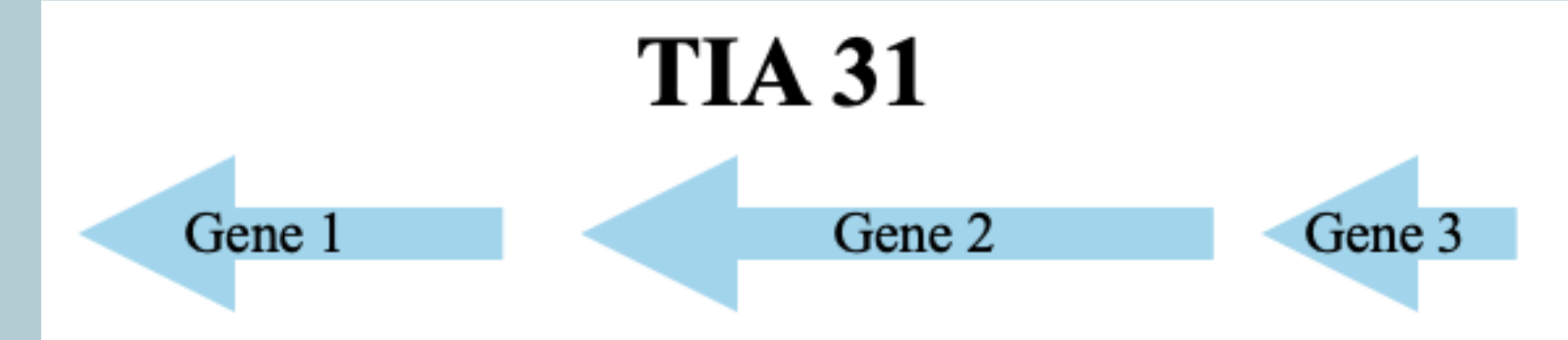
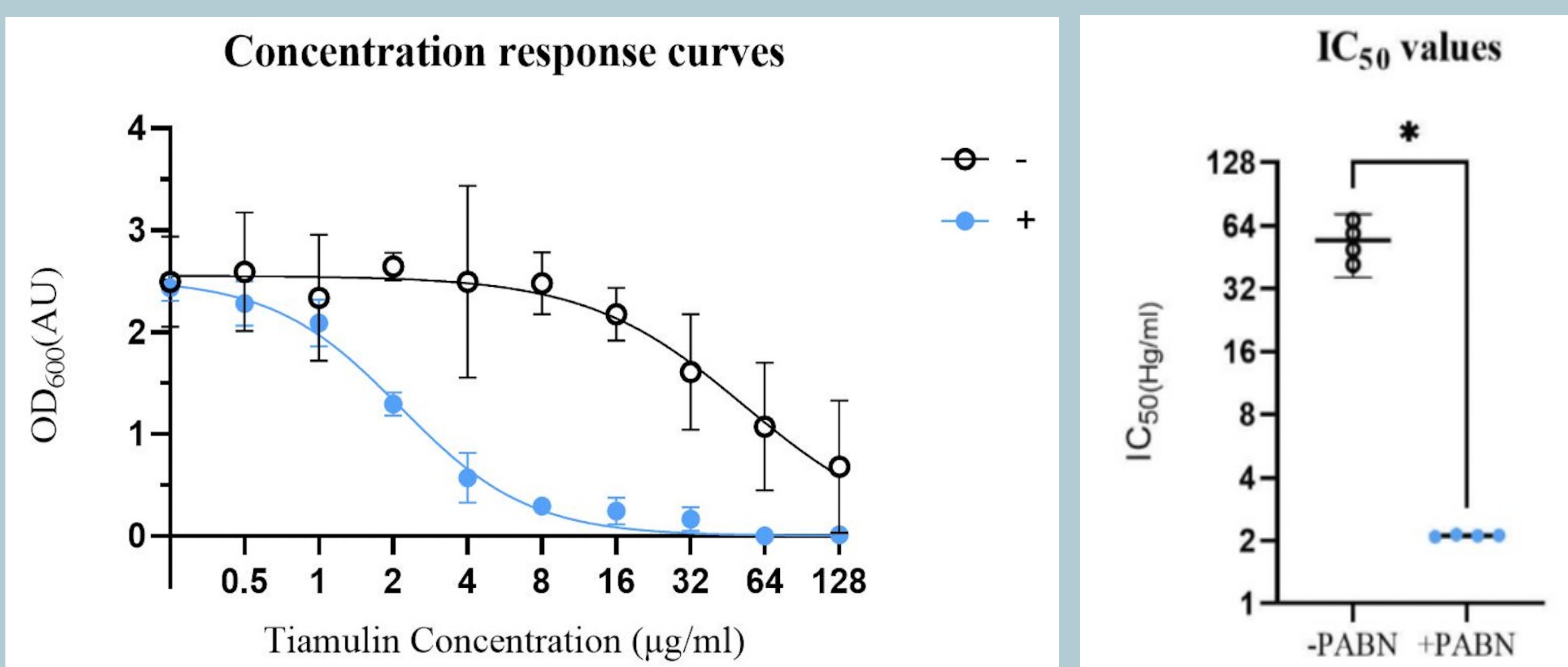
Results



Annotations

- Gene 1: Acetyltransferase (CARDp) and ribose-phosphate pyrophosphokinase (blastp)
- Gene 2: Acetyl transferase (CARDp) and acetylglucosamine diphosphorylase (blastp)
- Gene 3: n/a

PAβN sensitizes E. coli to Tiamulin:



Conclusion

- PAβN makes tiamulin much more effective against *E. coli*.
- Strong carboxylase presence found among inserts from functional metagenomic library after blastp.
- We hypothesize that the carboxylases may be modifying PAβN.

Acknowledgements

- S. Crofts, Terence, et al. *Mosaic Ends Tagmentation (METa) Assembly for Highly Efficient Construction of Functional Metagenomic Libraries*, 29 June 2021
- Card, Roderick M et al. "Identification of a New Antimicrobial Resistance Gene Provides Fresh Insights Into Pleuromutilin Resistance in *hyodysenteriae*, Aetiological Agent of Swine Dysentery." *Frontiers in microbiology* vol. 9 1183. 19 Jun. 2018, doi:10.3389/fmicb.2018.01183