Effect of ΔtrmB on Carbohydrate Metabolism in *H. volcanii* Strains

[redacted]

Introduction

Archaebacteria

- Prokaryote that can survive in extreme conditions
- Applications in biotechnology and astrobiology

Previous studies on *Halobacterium salinarum* show glucose compliments deletion of trmB

We examine the effects of glucose, galactose, xylose, and glycerol on Δ*trmB* to elucidate its significance *Haloferax volcanii.*

Terminology

Halophile:

- *H. volcanii* thrives in extreme salt conditions

trmB :

- Transcription factor that regulates gluconeogenesis

Optical Density (OD):

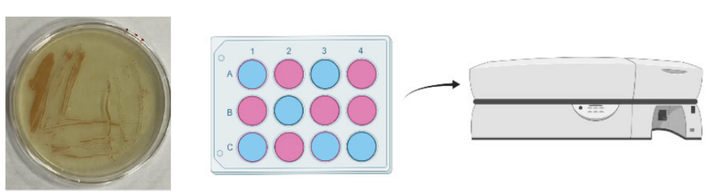
- Proxy for organism growth determined by light flow through a biological assay

Conserved regulator:

- Determines if a gene remains unchanged overtime

Methods

- Glucose, galactose, glycerol, xylose or no carbon were added to media (HvCa + WT/ ΔtrmB) to create solutions with 25 mM carbohydrate.
- The resulting solutions of WT or ΔtrmB strain were placed in a BioScreen robot to collect OD for 68 hours in 30-minute intervals.



Results

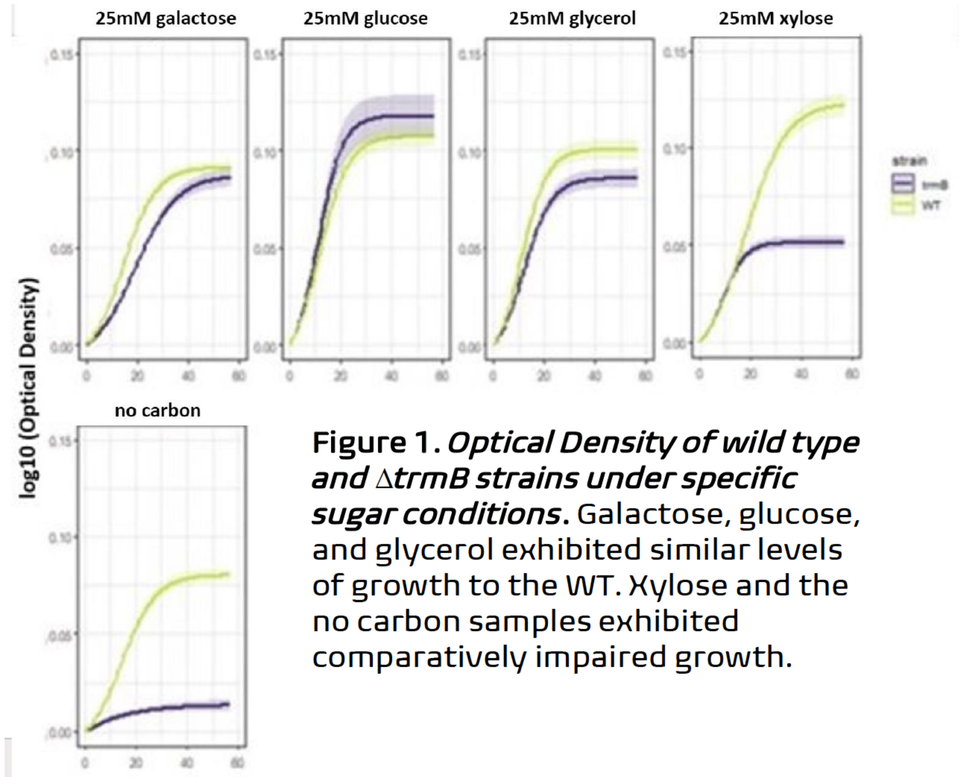


Figure 1. ***Optical Density of wild type and ΔtrmB strains under specific sugar conditions.*** Galactose, glucose, and glycerol exhibited similar levels of growth to the WT. Xylose and the no carbon samples exhibited comparatively impaired growth.

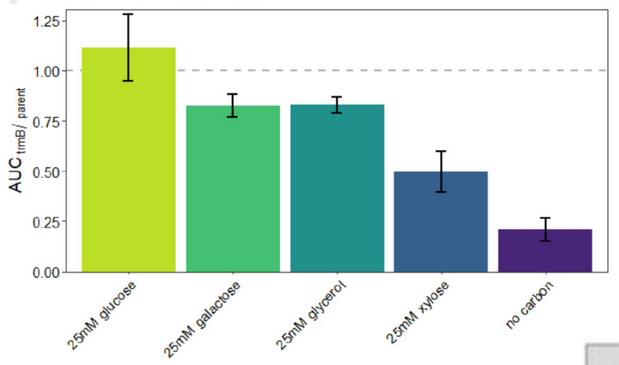
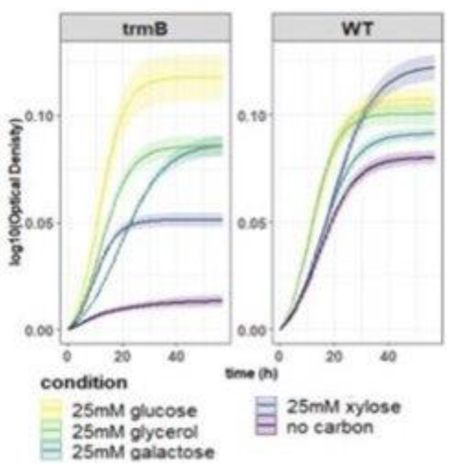


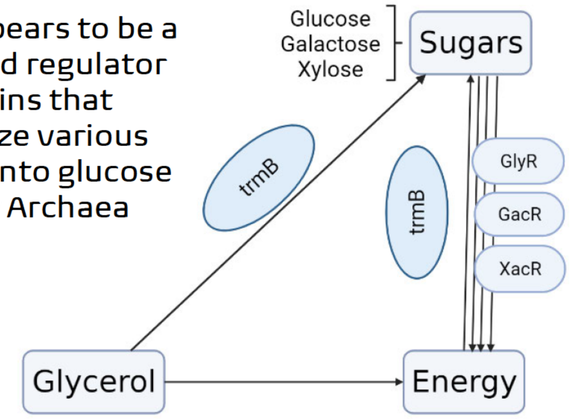
Figure 2. ***Growth proportion of Δ trmB in the presence of various carbohydrates.*** ΔtrmB thrived in the presence of glucose, galactose, and glycerol, but struggled to grow in the xylose and no carbon environments.

Figure 3. ***Growth of wildtype and ΔtrmB in the presence of various carbohydrates.*** ΔtrmB thrived in the presence of glucose, galactose, and glycerol, but struggled to grow in the no carbon environment.



Conclusion

- TrmB appears to be a conserved regulator for proteins that metabolize various carbons into glucose for many Archaea



- Glucose, Glycerol, Galactose, are potential complements for Δ*trmB*
- Differences in WT and Δ*trmB* in each carbon:
  - Glucose: No significant differences
  - Galactose: Δ*trmB* has a lower growth rate during the growth phase
  - Glycerol: Δ*trmB* has a lower carrying capacity
  - Xylose: ΔtrmB has a lower carrying capacity
  - No Carbon: Δ*trmB* has almost no growth

Discussion

- Genes promoted by trmB may play a role in catabolism pathways
- Leloir pathway for galactose
- Pentose-phosphate pathway for xylose
- Possibility of studying binding capacity of various carbohydrates to trmB
- There is value in studying the ability of *H. volcanii* to adapt to availability of specific sugars a means of representing variable environmental condition

Acknowledgements

Special thanks to the Schmid Lab at Duke and NCSSM's Dr. Amy Sheck for making this experience possible.

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