

# Can Elizabethkingia hold its alcohol?

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## ABSTRACT

## INTRODUCTION

Recently there was an outbreak of Elizabethkingia anophelis that resulted in sixty cases spread across Michigan and Wisconsin<sup>(1)</sup>. *E. anophelis* has proven to have significant bacterial resistance to Beta-Lactam antibiotics. <sup>(1)</sup> In this experiment we studied the amount of transcription of certain genes by *E. anophelis* in the presence of two beta-lactam antibiotics, Cefotax and Imipenem, in comparison to a control that was grown in optimal conditions to find if there were certain genes up-regulated, indicating they may play a role in the organism's resistance to the antibiotics. Our lab group focused more specifically on genes 2478, 2479, and 2480 of the *E. anophelis* genome which likely have to do with the uptake, transportation and conversion of mannitol to glucose in preparation for glycolysis.

## MATERIALS AND METHODS

In our research we used the RAST and Patric database to find our genes of study. We found our genes in the Patric database and decided on a group of genes to study. Our group of study was a group dealing with Alcohol breakdown. We had to switch our genes to the RAST database to be able to identify the RNA fold changes by using the BLAST website. Once we had our gene switched to the RAST gene number we could then identify the number of transcripts, and fold changes in our genes.

## RESULTS

Our lab group focused specifically on three genes, fig|1246994.5.peg.2478 (a mannitol/mannose dehydrogenase), fig|1246994.5.peg.2479 (a mannitol transporter), and fig|1246994.5.peg.2480 (a fructokinase). <sup>(2)</sup>

Figure 1

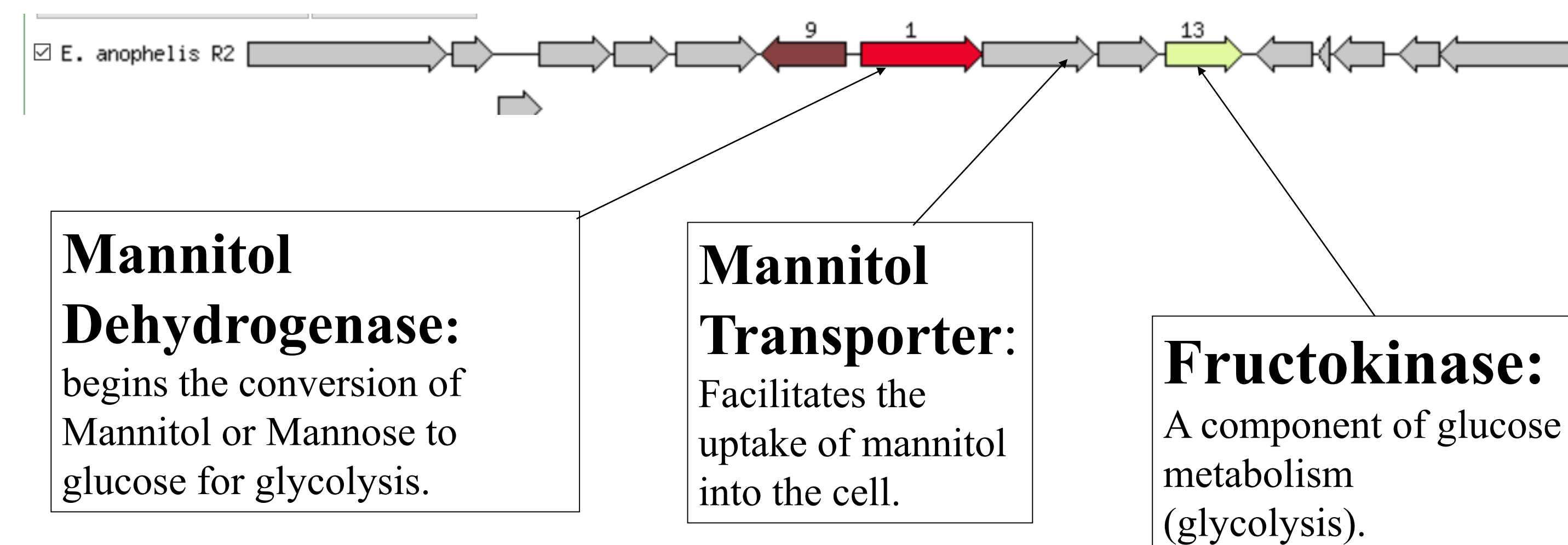


Figure 2

Gene	Control	Cefotax	Impipenem	Total Number of Transcriptions
Mannitol Dehydrogenase	2	1	4	7
Mannitol Transporter	2	1	4	7
Fructokinase	8	7	11	26

## DISCUSSION

The genes studied in the experiment (which are involved the breakdown of alcohol<sup>(2)</sup> specifically the alcohol Mannitol) are not significantly transcribed though there are significant fold changes in transcription among the control, Cefotax, and Imipenem cultures.

More interesting are the genes' positioning and function in relation to each other. 2479 appears to bring mannitol/mannose into the cell. Then 2478 converts the mannitol into glucose. After that, it can be used by the fructokinase to begin glycolysis. The gene 2477 appears to be transcribed with the pathway, it is a LacI regulator that could activate the pathway in the presence of mannitol. Gene 2480 has an unknown function, however it is transcribed with the rest of the pathway so it likely has something to do with the preparation of mannitol for glycolysis.

## REFERENCES

1. Canaan, Patricia. 2016. What is Elizabethkingia?. Presented at Oklahoma State University, Biochemistry and Molecular Biology, August 30, Stillwater, Oklahoma. Retrieved October 25, 2016. (1) <https://online.okstate.edu/d2l/le/content/51884/viewContent/364964/View>
2. "Protein BLAST: Search Protein Databases Using a Protein Query." National Center for Biotechnology Information. U.S. National Library of Medicine, n.d. Web. 01 Nov. 2016.(2) <https://blast.ncbi.nlm.nih.gov/Blast.cgi?PAGE=Proteins>
3. "Seed Viewer - Feature." Seed Viewer - Feature. N.p., n.d. Web. 01 Nov. 2016.(3) <http://rast.nmpdr.org/seedviewer.cgi?page=Annotation&feature=fig|1246994.5.peg.2478>