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Tardigrade's possible genes of interest

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1 Abstract

Tardigrades are the first known animal to survive in space. Thus we are trying to predict genes, responsible for utterly good DNA reparation, processing results of a TMS (Tandem Mass Spectrometry), looking for proteins that are most likely in a nucleus.

2 Introduction

Tardigrades, fascinatingly resilient microscopic animals also known as water bears or moss piglets, exhibit an unparalleled ability to endure extreme environmental conditions, ranging from the high altitudes of the Himalayas to the abyssal depths of the deep sea. Classified as "extremophiles," they can endure freezing temperatures, complete dehydration, high pressures exceeding 1,200 atmospheres, and radiation levels far surpassing those tolerated by other animals. Notably, tardigrades became the first known animals to survive the harsh conditions of space during the "Tardigrades In Space" (TARDIS) project in September 2007 [1].

This research not only expands our understanding of extremophiles but also holds potential implications for fields such as radiation biology and genetic engineering. Unlocking the secrets encoded in the tardigrade genome may pave the way for innovative strategies to enhance stress resistance in other organisms and even shed light on mechanisms relevant to human health and longevity.

3 Methods

To process our TMS data we create a local database consisting from our short peptides. We used local alignment-based search with diamond [2] utility and blast with Protein-Protein BLAST 2.5.0. Then utilities TargetP [3] and WoLF PSORT [4] were used to narrow down the amount of genes which are only take their effect in a nucleus.

4 Results

Diamond blasting showed only 2 genes: g4106.t1 and g12510.t1. Niether of these genes were predicted to be in a nucleus by both TargetP and WoLF PSORT. Blastp found 118 genes 34 of which were unique. Only 13 of those genes were present in our augustus data. For these 13 genes the analysis with TargetP was performed, list of genes marked as signal peptides (SP) was obtained. Genes were also analized with WoLF PSORT. All obtained tables were werged by gene names as keys.

5 Discussion

The data obtained suggests no strong evidence of any genes being univocally associated with good surivability of tardigrades. However, this research reveals some insights about potential functions of analized genes. We suggest genes to be experimentally further studied to recieve more information about their phylogeny and in vivo functionality.

6 Bibliography

References

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