**ABSTRACT**

The beetle *Dendroides canadensis* produces several isofoms of antifreeze proteins (DAFPs), that, when combined together and/or with other enhancers, can create a significant difference between melting and freezing points, termed thermal hysteresis (TH). Though the effects of DAFPs are well established, the exact mechanisms of how these molecules work are still debatable. To achieve a better understanding of these antifreeze proteins (APFs), our objective was to express DAFP-1, using Origami B (DE3) strain of *Escherichia coli* (E. coli), and purify the protein through several purification mechanisms.

**INTRODUCTION**

Antifreeze proteins (AFPs) depress the freezing point of water in a non-colligative manner while leaving the melting point unchanged; this difference between the melting and freezing points is called thermal hysteresis (TH) (Wang, 2005; Wang et al., 2009). This unique ability of AFPs enable a wide variety of organisms such as fish, plants, fungi and insects to be freeze avoidant or freeze tolerant thus allowing them to survive in otherwise deadly subzero climates. Given the uncertainty of the exact mechanisms that take place, the objective of this study was to express and purify *Dendroides canadensis*’ antifreeze protein (DAFP), specifically DAFP-1, to determine the crystal structure and further analyze the function and thermal hysteresis activity of DAFP-1. The possible applications of AFPs range from extended tissue preservation of transplant organs to increasing the freeze tolerance in crops (Wang, 2005).

**METHODS**

**RESULTS**

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<th>Figure 1.</th>
<th>Dendroides Canadensis</th>
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**CONCLUSION**

There are few theories explaining the mechanism behind how antifreeze proteins function; however, these are still debatable. Furthermore, there is still much to be learned on the enhancement of antifreeze protein activity. For these reasons, it was necessary to express and purify the beetle antifreeze protein DAFP-1 to determine its crystal structure and further analyze the thermal hysteresis activity.

**FUTURE PLANS**

We plan to continue studying and assisting in the expression and purification of insect antifreeze protein DAFP-1 with the purpose of gaining a better understanding of its crystal structure and on the enhancement of its thermal hysteresis activity.

**REFERENCES**


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