

Recent Advances in Biological Enzymes from Antarctica: A Comprehensive Narrative Review on Cold-Adapted Enzymes from The Antarctic Environment

Nur Afrina Norashid^a, Sharifah Aminah Syed Mohamad^{a*}

Structured Abstract

Background: The continent of Antarctica makes up the majority of the Antarctic area, while the Antarctic region, dominated by the Antarctic ice sheet, is the world's largest piece of ice. It is in the Southern Hemisphere and is distinguished by its extremely low temperatures. Antarctica has no permanent human residents, and it is known as a continent that has been relatively underexplored and is widely regarded by scientists as a natural laboratory. Antarctic organisms have been used to study extremophile enzymes, which are adapted to low-temperature environments. These “cold-adapted enzymes” have evolved to function effectively under extreme conditions.

Methods: This review article provides a comprehensive overview of the research conducted in this field, as documented in Google Scholar. It delves into the world of Antarctica by determining the diverse living organisms that are found there and the adaptations that they possess. Furthermore, it compiles and synthesizes all available information focusing on cold-adapted enzymes originating from the Antarctic environment and examines the technological and industrial advantages of utilizing these enzymes.

Results: This study shows that despite the absence of permanent human residents, Antarctica is home to a diverse array of living organisms. Recent advances in the study of biological enzymes from Antarctica have unveiled a wealth of knowledge about cold-adapted enzymes and their unique properties. These enzymes exhibit remarkable stability and activity at low temperatures, making them invaluable for biotechnological applications in the industrial fields.

Conclusion: In conclusion, the findings of this study indicated that further research and exploration of Antarctic microbial diversity have the potential to uncover novel enzymes with exceptional properties that will contribute to scientific innovation and practical applications in various industries

Keywords: Cold-Adapted Enzymes, Antarctica, Industry

*Correspondence: sharifah459@uitm.edu.my

^a School of Biology, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia