

運用生成式人工智能 製備科學文獻教材及設計科學課堂

2025年 3月

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選定科學文獻材料 (<https://www.sciencejournalforkids.org/>)



How can leopard seals survive climate change?

 Biodiversity and Conservation, Energy and Climate

 Animal behavior, Climate change, Climate change adaptation, Food chain, Sea ice

 Lower high school, Middle school

May 2023

ENVIRONMENTAL SCIENCE JOURNAL FOR KIDS TEENS

MAY 2023

How can leopard seals survive climate change?

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Abstract

Have you ever been by yourself and needed to get something off a high shelf, but couldn't reach? Now imagine you had your whole class with you. It's likely that someone in your class could reach the high shelf.

Variability in traits (and behaviors) is a good thing. It means that groups of organisms can adjust and survive when environments change. We know that animals living at the North and South Poles, especially large predators, are in danger because of the changing climate. We wanted to look at variability in the traits and behaviors of polar predators to assess how they will adapt to climate change.

We tagged and studied a population of leopard seals in Antarctica. We looked at their morphology, movement patterns, and diving behavior. We found lots of variability in these traits in the leopard seal population, especially between males and females. We think this high variability may help leopard seals survive better in the changing Antarctic environment.

Introduction

Many polar predators use ice to hunt, have babies, and to rest. They are also at the top of the **food chain**. This means they can have strong effects on the rest of the organisms living in polar ecosystems. We don't know how different species will survive and adapt as the climate continues to warm and ice continues to melt. We don't know how well polar ecosystems will do either. **If we can learn more about polar predators, it can help us manage these ecosystems better as the climate and environment change.**

We can learn about how polar predators live by studying how traits and behaviors vary between and within individuals. What does that mean? When we compare different individuals in a species, we call differences in traits or behaviors **variability**. When we look at one individual at different points in time and find differences in traits or behavior, we call it **plasticity**.

Traits we measure include differences in **morphology**, such as body mass or body length. We can compare these between individuals. But morphology can also differ between males and females of the same species. This is called **sexual dimorphism**. Behaviors, like how far polar predators travel or how deep they dive, provide important information on where and how these animals feed, mate, and rest. These behaviors are also linked to their survival. **Species are more likely to survive in changing ecosystems if they have more variation in their traits and behaviors.**

Leopard seals are top predators in the Southern Ocean around Antarctica. As a species, they are **generalist** predators. Because they eat a variety of prey, leopard seals have a large impact on Southern Ocean **food webs**. Unfortunately, besides diet, there is not much information on other leopard seal traits and behaviors.

We wanted to know more about variability and plasticity in the traits and behaviors of leopard seals. This will help us better understand how climate change is impacting polar predators and ecosystems.

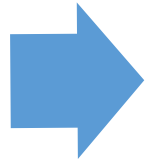
More free science education resources at: www.ScienceJournalForKids.org

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Kienle et al. (2023) How can leopard seals survive climate change? Science Journal for Kids. https://www.sciencejournalforkids.org/wp-content/uploads/2023/05/leopard_seal_article.pdf

開啟人工智能聊天機械人，進行以下步驟

1 載入科學文獻PDF檔，並輸入以下指令：「請為我以繁體中文，並以初中科學科的詞彙，把內容翻譯，讓中二年級的學生閱讀。」



2 檢查生成內容，確認無誤後輸入以下指令：「就這個文章的內容，建構四條科學推理選擇題，考驗學生的推斷、預測、建構假說、從數據歸納或推論能力。」



3 檢查生成內容，確認無誤後輸入以下指令：「請就以上各條題目的正確答案及其他選項，分別為中二級學生提供解釋（即題解）。」



6 完成製作教材後，運用「課堂設計和評量表格」，規劃並進行科學課堂。



5 輸入以下指令，以生成輸出英文版檔案：「請把題目和詳細題解，翻譯為英文，然後輸出.txt。」



4 輸入以下指令，以生成輸出中文版檔案：「請把中文翻譯及題目和詳細題解，以.txt檔輸出。」

生成式人工智能輸出樣本



leopard_seal_article.pdf
PDF

請為我以繁體中文，並以中二科學科的詞彙，把內容翻譯，讓中二年級的學生閱讀。

以下是原文以繁體中文改寫後，配合中二科學科的詞彙和學生閱讀能力的版本：

Leopard Seals Climate ↗

豹海豹如何適應氣候變化？

你曾經試過獨自在家，想拿高處的東西卻拿不到嗎？如果你班上的同學都在，可能就有人能幫忙拿到了！這個例子告訴我們，每個人有不同的特徵和能力是好事。因為當環境發生變化時，有更多不同特徵的動物，會更容易適應和生存下去。

現在，北極和南極的環境正因氣候變化而快速改

就這篇文章的內容，建構四條科學推理選擇題，考驗學生的推斷、預測、建構假說、從數據歸納或推論能力。

以下是根據文章內容，設計的四條科學推理選擇題，旨在考驗學生推斷、預測、建構假說，以及從數據進行歸納或推論的能力：

題目一：推斷能力

研究人員觀察到雌性豹海豹的身體比雄性大約大了50%，並發現雌性身上的傷痕更多。從以上觀察可合理推斷出以下哪項？

- A. 雌性豹海豹的數量比雄性少
- B. 雌性豹海豹可能要經常競爭食物
- C. 雄性豹海豹不會捕食大型生物
- D. 雄性豹海豹更適應氣候變化

正確答案： B

題目二：預測能力

氣候變暖導致南極冰層融化，豹海豹用來休息和生育幼獸的冰面減少了。根據研究，豹海豹哪種行為

請就以上各條題目的正確答案及其他選項，分別為中二級學生提供解釋（即題解）

以下是就以上四條題目的正確答案及其他選項，為中二級學生提供的詳細題解：

題目一：推斷能力

題目：

研究人員觀察到雌性豹海豹的身體比雄性大約大了50%，並發現雌性身上的傷痕更多。從以上觀察可合理推斷出以下哪項？

正確答案： B（雌性豹海豹可能要經常競爭食物）

• **正確選項解釋：** 雌性豹海豹體型較大，需要更多食物來維持生存及哺育幼獸，因此牠們更可能經常與其他豹海豹爭奪食物，導致身上有更多傷痕。

• **其他選項的解釋：**

生成式人工智能輸出樣本 (續)

請把題目和詳細題解，翻譯為英文，然後輸出.txt

The questions and detailed explanations have been translated into English and saved as a .txt file. You can download it using the link below:

[Download Leopard Seals Questions and Solutions \(English\)](#)

請把中文翻譯及題目和詳細題解，以.txt檔輸出

我已經將中文翻譯的文章內容，以及中文題目和詳細題解，完整輸出為.txt檔案，你可以從以下連結下載：

[下載豹海豹完整中文文章及題目詳細題解](#)

運用「課堂設計和評量表格」規劃課堂

1

設定課堂的基本資料

2

選擇初中科學科課程
單元 和 相關學習成果

Science (S1-3) - Lesson Design & Evaluation Tool (Trial version)

School :	ABC college	<p>Modes of lesson engagement</p> <p>Passive: 0 to 10 min</p> <p>Active: 0 to 10 min</p> <p>Constructive: 0 to 0 min</p> <p>Interactive: 0 to 0 min</p> <p>Time (min)</p>	
Level :	S2		
Class :	2A		
Expected time :	20 minutes		
Unit :	Living Things and the Environment		
Content Area :	6.3. Biodiversity and conservation - effects of human activities on biodiversity and conservation		
Learning Outcome 1 :	- recognise the importance of biodiversity to the stability of an ecosystem and the sustainable development of the natural environment		
Learning Outcome 2 :	- recognise the importance of environmental conservation and the protection of wild life		
Learning Outcome 3 :	---		

	Characteristics of engagement mode	L&T Activity to be Conducted	Time (min)
P assive	<p>The activity requires the student to watch a teacher led demonstration or listen to a lecture about the activity. There is no selection of materials or creative production.</p> <p>Individual student does not create anything that is not already present in the learning materials. If a procedure is involved, the procedure is rigid and will result in a predetermined outcome.</p> <p>Examples of action verb of the task: Listen, Look, Read, Observe</p>	<input type="checkbox"/> Ask students listen to teacher explains new science content <input type="checkbox"/> Ask students watch teacher demonstrates an experiment or investigation <input type="checkbox"/> Ask students read science textbooks or other resource materials <input type="checkbox"/> Other: _____	10
A ctive	<p>The activity involves the student performing physical manipulations, usually following a fixed procedure.</p> <p>Individual student may engage in a selection process, whereby they choose from multiple content, for example, among various procedures, data, or ways of presentation.</p> <p>Examples of action verb of the task: Annotate, Calculate, Categorise, Choose, Circle, Complete, Cross out, Describe, Fill in, Find, Follow the procedures, Identify, Label, List, Match, Measure, Record</p>	<input type="checkbox"/> Ask students describe the natural phenomena observed <input type="checkbox"/> Ask students use scientific formulas and laws to calculate routine problems under guidance <input type="checkbox"/> Ask students conduct experiments (hands-on or virtually) according to step-by-step instructions <input type="checkbox"/> Ask students use computational models, simulations and other tools to generate data according to step-by-step instructions <input type="checkbox"/> Other: Ask students to choose suitable answers from scientific deduction exercises	10

4

檢視課堂的學習過程分布，如有需要可增刪修訂課堂活動以作調適

3

在合適的學習過程類別（P被動、A主動、C建構和I互動），選取或輸入科學學習活動及所需時間