EDUCATIONAL BOOKLETS
TÉMOINS POLAIRES
À l'écoute du climat.
MADE BY

UNDER ANTARCTICA EXPEDITION 2025

UNDER ANTARCTICA

Booklet n°2 - Glaciers and biodiversity

Heïdi

Paco

Matthieu

We have finally arrived at the starting line : the Novolazarevskaya scientific station !

Novolazarevskaya station

We have been waiting for this moment for so long. The geologists' and glaciologists' work here is fascinating, but 4,000 kms lie ahead. We must not delay any longer!

The scientists are really nice, but on the other hand, I don't understand a word they're saying...

Добро пожаловать !

It's Russian, Paco!
It means "Welcome" in Russian.
This base was founded in 1961.
Today, about thirty people work here during winter.

They welcomed us warmly, we even had a quick sauna before setting off!

One of the scientists told me we are in Queen Maud Land. Was she an Antarctic queen?

CHAPTER II : A SANCTUARY OCEAN

Queen Maud, queen of Norway, as the wife of King Haakon VII

Please meet Queen Maud. She was Queen of Norway! Why is it named after her? I'll explain it to you, Paco!

Antarctica is divided up like a giant cake.

1 In 1930, the Norwegian explorer Hjalmar Riiser-Larsen landed on this land, which enabled Norway to claim a part of Antarctica.

2 It's important to know that during summer, Antarctic waters become so rich in krill that it entices whales away from warmer waters to enjoy this feast.

Yum!

3 Up until 1959, Norway and other nations took advantage of this to hunt whales, causing the near-extinction of some species, such as the blue whale..

4 Humans hunted whales for their fat, which they melted into oil for light and heat. This fat, called "blubber", helps whales stay warm in both cold and warm waters.

5 In 1994, the Southern Ocean became a sanctuary where whale hunting is prohibited. It was a major victory: all countries joined forces to protect this species. One of the greatest environmental wins in the world.

Speaking of staying warm, we also have to bundle up for the expedition! Otherwise, hello frostbite (that's when the cold "eats" your skin)!

Protection against falls, blocks the wind, and keeps your head warm.

Eye protection from : sunlight reflection on the snow (like a mirror), icy winds, and snow crystals.

Inuit technique : the fur slows down the wind and prevents snow from sticking.

Protection against extreme cold (down to -60 °C) and the notorious strong winds, called katabatic winds.

But our most important gear is our smile and our courage!

Wait, Heïdi, where is Paco??!

I should cover up too... my nice fat layer, perfect for South Africa, isn't warm enough here! I need to keep walking to stay warm...

Hi cousin! You're funny with your spotted coat! I'm going for the more classic look: white belly, black head. You don't seem local — isn't it too cold for you?

Kingston,
an Adélie penguin

Hi there ! Honestly, my palmed feet are freezing! How many of you live around here?

There's a whole bunch of us : more than 16 species worldwide, but only 8 in Antarctica. Come on, I'll introduce you to a few!
Pssst... one of them is my brother!

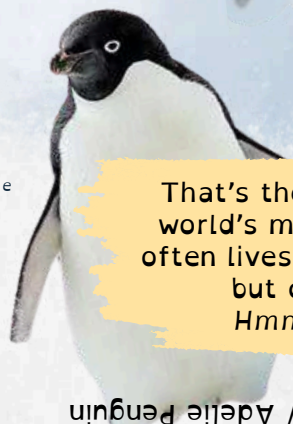
Just like yours, our wings aren't made for flying... but to swim in the water, they make us speed through like torpedoes!

A whole bunch of cousins

Two of the penguin cousins' names were blown away by the wind. Use the clues on the page to work out their names!

Here's the **emperor penguin :** he's a bit like our leader. He's the tallest (1.30 m), the heaviest at (around 40 kg), and can stay underwater for 18 minutes!

The Gentoo penguin builds its nest on beaches and in the grass.
It's the fastest penguin in the water, a real champion!



It's named after a pasta shaped like narrow tubes.

Known for the yellow crest of feathers on its head, which it uses to attract a female, the M_____ Penguin sometimes gathers in hundreds of thousands during the breeding season.

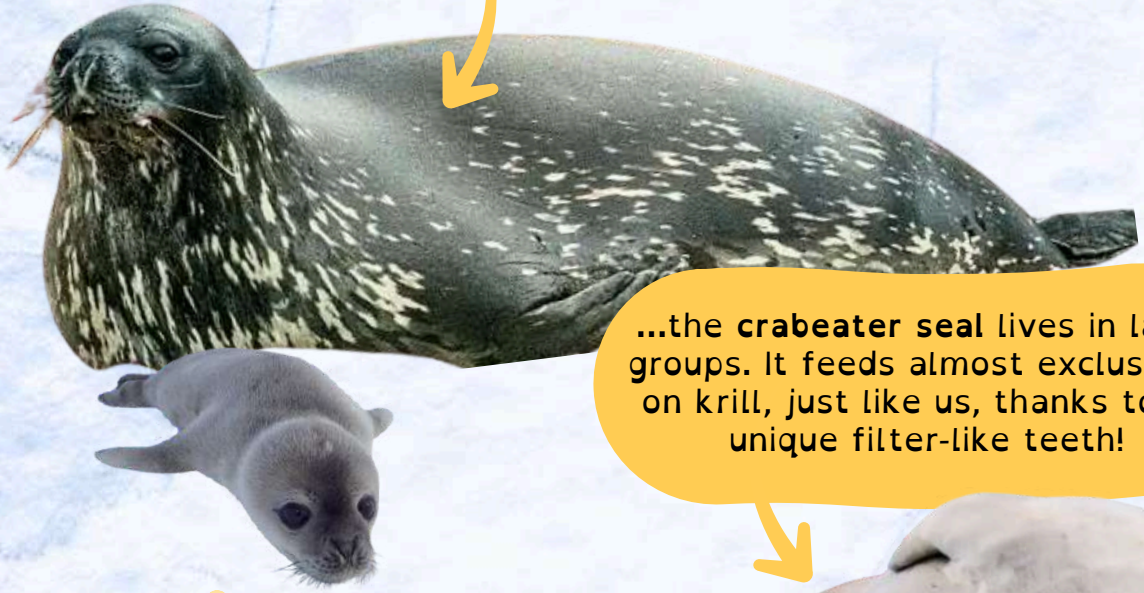
That's the _D____ Penguin. It's the world's most widespread penguin. It often lives in large colonies! It's small but can dive up to 175 m.
Hmm... it looks familiar...

Solution : Macaroni Penguin / Adélie Penguin

Thanks Kingston for the introductions! When I arrived here, I came across lots of mammals. There were plenty of seals, and most of them were friendly. But a few almost mistook me for a fish... Since you live here, do you know them?

Oh yeah, cuz! Some of the seals are my friends. Let me introduce them to you!

The **Weddell seal** lives year-round along the coast and hunts fish and squid by diving deep. It's a solitary hunter, whereas...



...the **crabeater seal** lives in large groups. It feeds almost exclusively on krill, just like us, thanks to its unique filter-like teeth!

I'm a Weddell seal pup. We can dig breathing holes in the ice with our teeth! But we have to be careful as it can damage our canines!

Ah, Paco, there you are! Matthieu and I were worried. You obviously find animals fascinating; wait till you see the tiny ones : the microfauna! Without it, nothing could survive here. Take a look under your feet with this magnifying glass : it's stunning!

The tardigrade

A nature's cleaner — it eats invisible crumbs, gets eaten itself, and helps plants grow!

So tiny, only 0.1 to 0.2 millimetres long!

This tiny superhero can withstand temperatures from -270 °C to 150 °C. It can even survive in space!

And that's thanks to its cryptobiosis: a state of slowed-down life where its metabolism works at just 1%! It's like falling asleep until conditions return to normal!

Cryptobiosis comes from the Greek words "kryptos" (hidden) and "bios" (life): It's therefore "hidden life"

This tardigrade is one of the hidden gardeners of the White Continent. It breaks down bird droppings, algae, and plant debris, releasing the nutrients that plants need. Thanks to it, the rare ice-free soils breathe, turn green, and support life!
You know, healthy soil means healthy animals too. These microfauna maintain the soil and keep it alive!

HEYYYY THEEEERE...
WE'RE NOT BOTHERING YOUUUU,
ARE WE?!

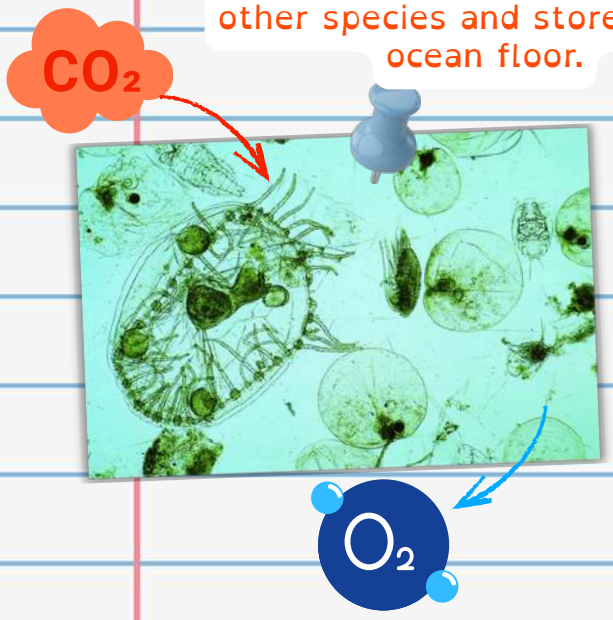

But... but...
Who's speaking?
It's me, Mr. Glacier!
I'm not only beautiful and cold : I shape the soil, influence ocean currents, and provide habitats for all those species you've been talking about, even the microscopic ones.
Without me, life would be very different...
I'm worried...
For the past few years, I've been itchy, hot, sweating, and... I think I'm melting more than I should.
The more I melt, the more I change the surrounding seawater, adding freshwater to what's usually salty. Not cool for the neighbors who are used to different conditions!
Habitat for some animals
Water change :
More freshwater

Exactly! Glaciers are melting and releasing freshwater rich in iron, which is good for phytoplankton (tiny algae). But too much glacial meltwater makes the sea murky and blocks the light needed by phytoplankton.

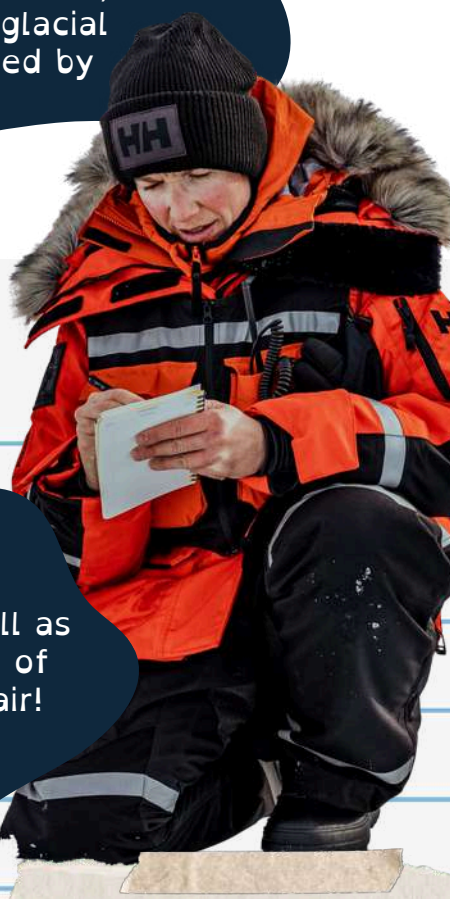
Phytoplankton, besides being at the base of the marine food chain, also plays a crucial role. Let me explain :

Phytoplankton

It traps carbon (CO_2, you know, the stuff that warms the Earth), which will later be captured by other species and stored in the ocean floor.



Then it produces **oxygen** like plants do: it transforms **sunlight** and **CO_2** into **O_2** (which we need to breathe) through **photosynthesis**.



It's as small as the width of human hair!

Help Paco make a sticky note about phytoplankton!

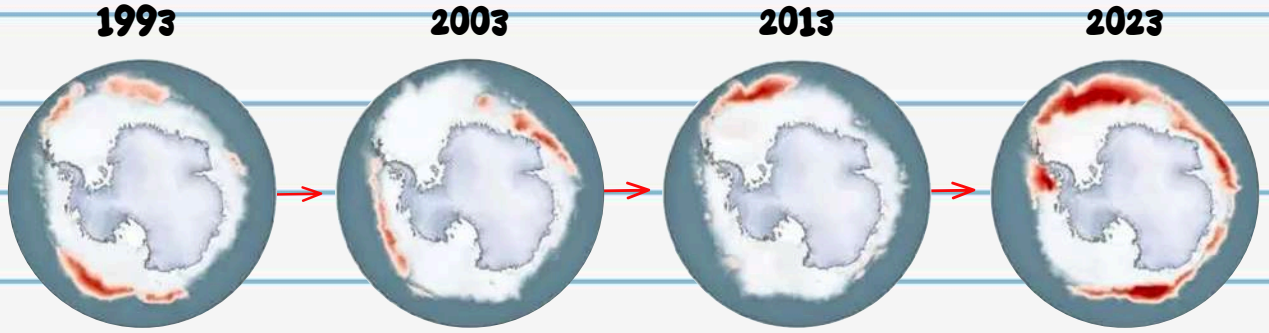
Description :

Habitat :

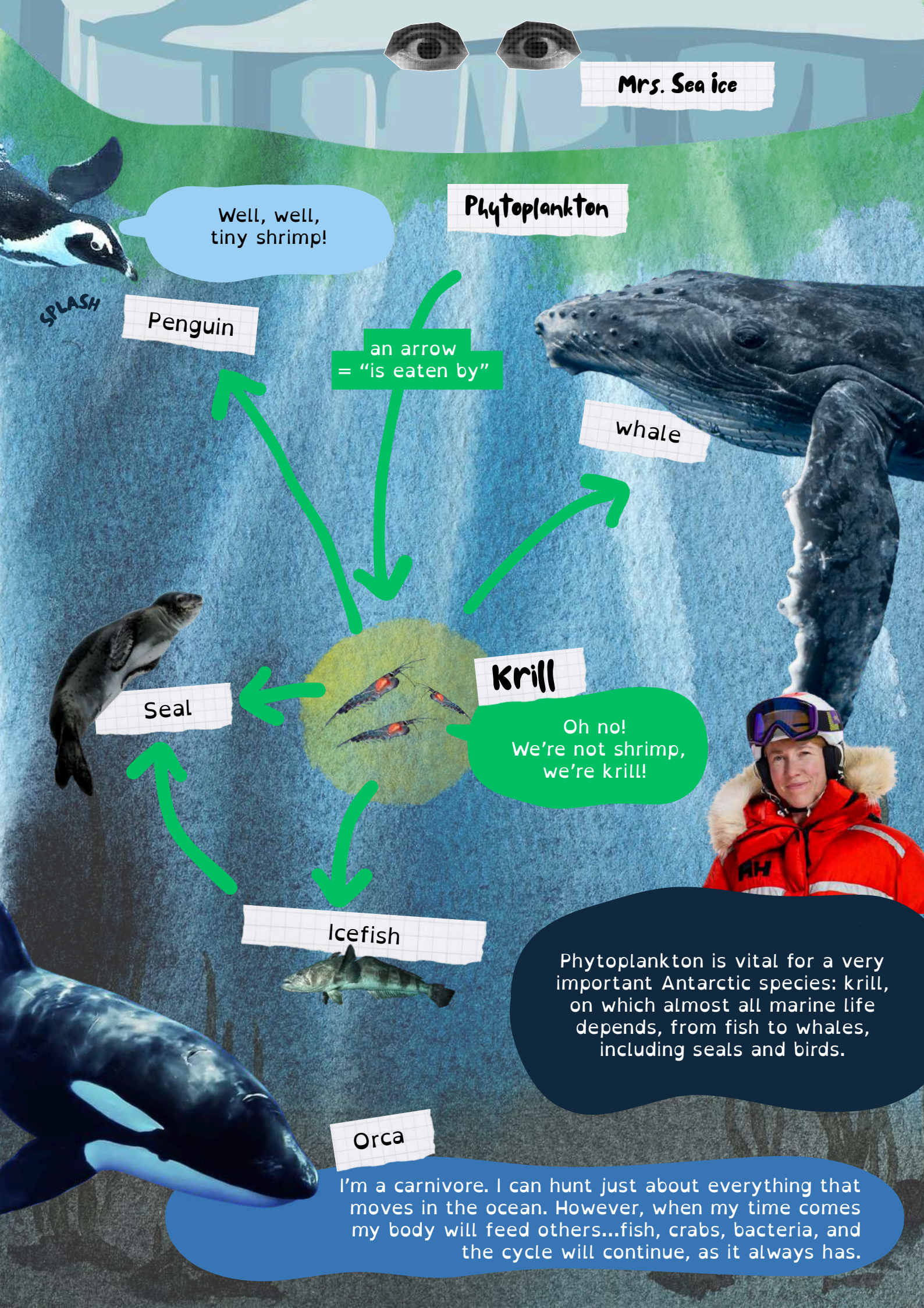
Power :

Threats :

There is an even greater threat to phytoplankton: these microalgae live under the sea ice, whose surface is melting every year due to climate change.



Wait, I'm going to take a closer look at the phytoplankton!


Mrs. Sea ice
Well, well, tiny shrimp!
Phytoplankton
SPLASH
Penguin
an arrow = "is eaten by"
whale
Seal
Krill
Oh no! We're not shrimp, we're krill!
Icefish
Phytoplankton is vital for a very important Antarctic species: krill, on which almost all marine life depends, from fish to whales, including seals and birds.
Orca
I'm a carnivore. I can hunt just about everything that moves in the ocean. However, when my time comes my body will feed others...fish, crabs, bacteria, and the cycle will continue, as it always has.

Well, my friends, you can count on me.
I understand that the animals I've just met depend on the good health of Mr Glacier and Mrs Sea Ice. I'll pass on your message to the Penguin Council...
Thank you!

You can count on me too, Mr. Glacier... Our radar can read the signs underground, understand your transformations better, and remind humans their duty toward you.

Wow, this first week has been full of emotions!
I've met a new best friend, Kingston the Adélie penguin, who introduced me to his bunch of cousins and his coastal species' friends. With my magnifying glass, I got to observe the microfauna, and I even met some krill! Very friendly! A bit cold, but friendly too, I even had a chat with a glacier. What I can take away from these adventures is that each element, from the tiniest krill to the largest glacier, plays a role in the food chain and maintaining the balance of this icy world!
See you soon,

Paco

SPECIAL EDITION

The Antarctica Times

SPECIAL EDITION

Antarctica

19 November 2025

Finally in Antarctica

AFTER YEARS OF PREPARATION, HEÏDI SEVESTRE AND MATTHIEU TORDEUR ARE FINALLY SETTING FOOT ON THE WHITE CONTINENT!

Heïdi, Matthieu and Paco

"After several days stuck in our tent near our drop-off point (in the Thorshammer area), we finally managed to thread our way between the crevasses and climb out of the basin where we had been pinned down by the wind."

"The midnight sun has just appeared, but temperatures still drop sharply in the evening, making camp setup and preparations before a night's rest particularly slow and demanding after a day spent in the wind."

Heïdi and Matthieu working on their radar

Basecamp

Several days stuck head wind, but already 200 km covered.

Kite-ski

Shall we play?

1 True or False: How do you fight the cold?

When it's cold, the Adélie penguin can find twigs on the ground and make a campfire to keep warm.

☐ True ☐ False

The blue whale has a thick layer of blubber that can reach 30 cm, which helps retain heat.

☐ True ☐ False

Icefish are lucky to have antifreeze blood, which prevents them from freezing!

☐ True ☐ False

The Weddell seal, in addition to a thick layer of blubber, can slow down its blood circulation in its flippers and skin in the aim to retain heat.

☐ True ☐ False

2 Circle the four items you would most like to take in your pulk if you went on an expedition. Also find the two items that have nothing to do with the expedition and mark them with a small cross.

Long-range binoculars

Speakers

Extreme cold down jacket

Thick gloves

Insulated bottles

Flip-flops

Sleeping bag

Snow shovel

Solution game 1 : Yellow = False / Red = True / Green = True / Blue = True

3 To help nature near you, match each action to its benefit!

a. Plant a hedge or flowers	•	•	1. The better we know, the better we protect!
b. Turn off the lights at night	•	•	2. Birds have a home
c. Build a birdhouse	•	•	3. Insects find shelter and food
d. Learn about plants and animals	•	•	4. Less light pollution
e. Reduce plastic consumption	•	•	5. Helps reduce the risk of animals mistaking it for food

Solution : a/3 ; b/4 ; c/2 ; d/1 ; e/5

The Magic Map

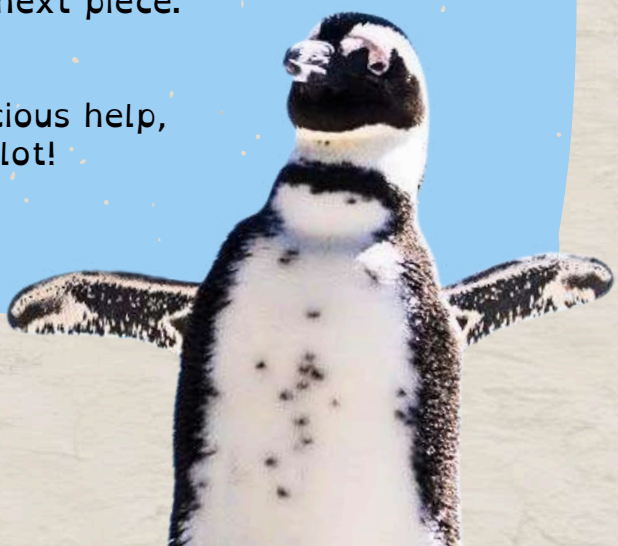
For the Penguin Council, Heïdi, Matthieu, and I are entrusting you with **a very important task.**

Your mission: **assemble the 6 pieces of the Magic Map of Antarctica.** Fill them in and personalize them with all the **important information** you think will help **the Emperor Penguin during the Penguin Council!**

Cut and paste images, write, trace, draw, color... let your imagination run free to share your knowledge and messages.

On page 16, you'll find the first piece of the map, and each week you'll receive the next piece.

Thank you for your precious help, it will help me a lot!



Lexicon

Food chain: A sequence of plants and animals in which each is eaten by the next. A food chain shows how living beings depend on each other and maintain a natural balance.

Geologist: She/He observes and analyzes soils. Using the data, a geologist can study the composition, structure, history, and the soil evolution on our planet.

Glaciologist: A specialist in ice, who can study glaciers, icy lands, sea ice, or the properties of ice itself.

Inuit: An indigenous people of the Arctic. The Inuit have lived there for thousands of years and have a fascinating culture! They were previously called “Eskimos” by europeans but they prefer “Inuit,” which means “human beings” in their language.

Microfauna : Collection of many tiny animals that live in a specific environment. This environment can be soil, moss, a cave, or even sand.

Organic matter: This refers to all the material that makes up living beings (plants, animals, or micro-organisms). It can be made of decomposing plant and animal debris, or other biological residues.

Katabatic wind: The name comes from the Greek word ‘katabasis,’ meaning ‘descending.’ It is a wind made of cold air, which, being heavier, rushes down a slope or terrain and can accelerate, sometimes reaching speeds of up to 200 km/h.

Any question ?

Got a question or a kind word for Heïdi and Matthieu? Send it through their mailbox. They’ll reply as soon as possible!

To go further

Sounds of Antarctic penguins

A superb Antarctic bird: the Northern Fulmar

The Importance of Krill in Antarctica

The wind at the Novolazarevskaya Base

the krill :

the base of the marine food chaine

Southern Ocean

Novolazarevskaya base

8 penguin species in Antarctica

Southern Pole of inaccessibility

Protecting glaciers

means protecting Antarctic biodiversity

Union glacier

Cut out the images