

Ambassador visual story from the field

PathoPast– exploring the microbial past of an Antarctic penguin colony



Photo © Alex Williams

by Alex Williams

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Introducing PathoPast

Long-term monitoring of Antarctic wildlife is challenging due to the remote and harsh environment. The lack of long-term data means that much remains unknown about the pathogens and microbes of Antarctic animals. However, animals leave behind microbial traces in their faeces, and the cold Antarctic environment can help preserve this genetic record.

The PathoPast project aims to explore the microbial history of an ancient penguin colony using lake sediment rich in penguin guano (droppings) which accumulated over thousands of years. To do this, the PathoPast team spent three weeks at the Professor Julio Escudero Base on King George Island.



The Journey Begins



Photo © Alex Williams



Photo © Alex Williams

Above: Snowy views of King George Island, Ardley Island and the Nelson Island ice dome

Below: Flying over Ardley Island

Our small field team of three set out to join the Chilean Antarctic Expedition in mid-December 2025.

A few days before, we spent some time practicing lake coring in the UK. This was a critical step to ensure no time would be wasted when we arrived at our field sites.

The Journey to the Escudero Base was not a short one. From the UK we flew to São Paulo, on to Santiago and then Punta Arenas. When we arrived in Punta Arenas, Chile, we still did not know exactly on which day we would be travelling to King George Island.

We had to make sure we were ready to get to the airport at a moment's notice.

Flying over the Drake Passage, we were immediately captivated by The South Shetland Islands as they emerged from beneath the clouds.



Fine weather is needed to reach Ardley Island by small boat – a view from the Ardley on a sunny morning (top). The rugged coastline of King George Island is both majestic and forbidding (bottom).



Photo © Alex Williams

When the team was not in the field, we spent much of our time at the Chilean research station. We would go to a nearby warehouse to prepare our equipment in the evenings when a suitable weather window was anticipated for the following day.



Villa Las Estrellas has all the fundamentals, an infirmary, gym and even a very small bank. A large generator unit helps power multiple buildings. Back-up generators are activated during the occasional power cut. Part of the Russian Bellingshausen Station can be seen in the foreground. A special tracked vehicle called a snowcat can be seen in the bottom left corner.



Photo © Alex Williams

Although local temperatures do not reach the extreme cold of the Antarctic mainland, the elements still take a toll on structures.

Concrete is prone to shattering due to the repeated freeze-thaw, paint peels and bare metal corrodes with time. It takes a lot of effort to keep everything running under these conditions.

Life & Death in the Cold

Part of our fieldwork involved collecting soil and fresh faecal samples from the currently active penguin colonies on Ardley Island and King George Island.

Visiting these penguin colonies further highlighted that this is a harsh and difficult environment to survive in. We would often happen across the breast bones of unfortunate penguins (above).

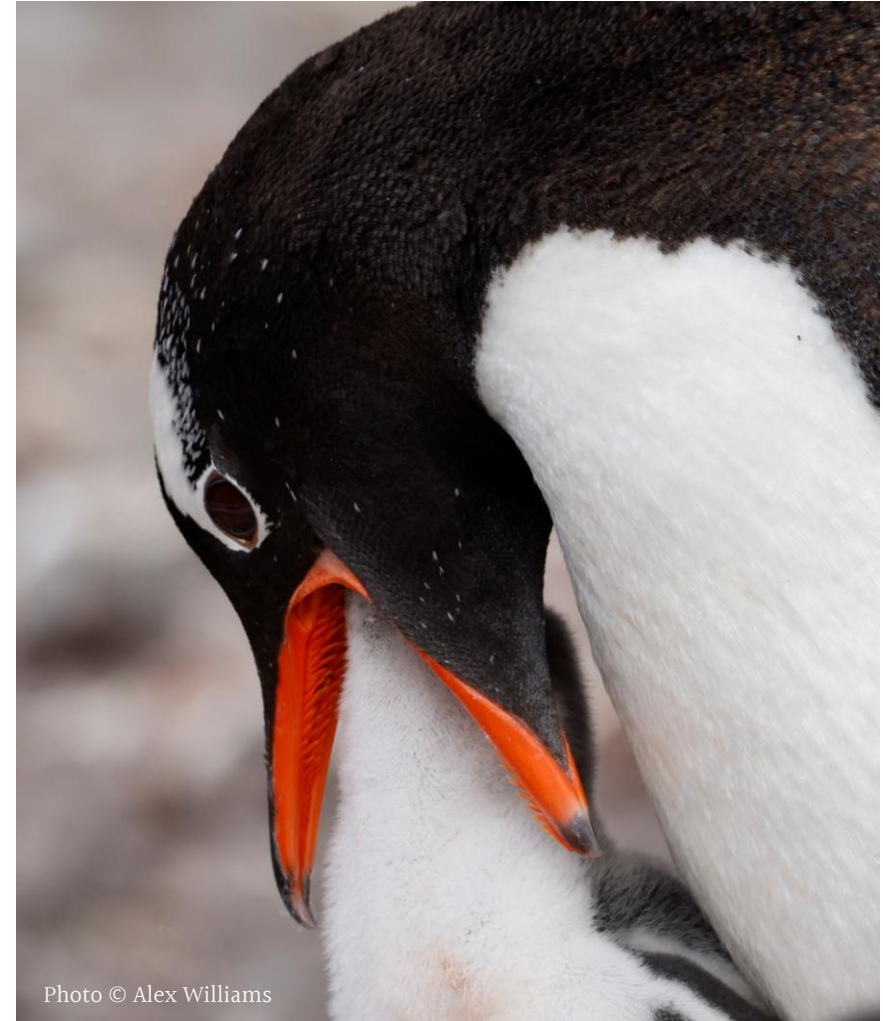
Occasionally, we also saw the remains of a whale. Several great boulders of bleached and pitted bone that were usually scattered in a rough row, tracing the line of a once mighty backbone (below).



Photo © Alex Williams



Photo © Alex Williams



The sight of the large gentoo penguin colony Ardley made a lasting impression on us. It is hard not to find these improbable creatures endearing, especially when you see how devoted they are to their chicks. Each nest was carefully constructed from a mound of pebbles, and most were home to one or two chicks.

It was interesting to watch feeding time. The gullet of the adult gentoo penguins are a vivid orange-red, with backward-pointed spines.



Recent estimates suggest there are around 5000 pairs of gentoo penguins on Ardley Island. Many of them decided to make their nests on this ridge. The views may be good, but it seems like quite a hike for short penguin legs.



Photo © Alex Williams

An important nemesis of the nesting penguins– a skua, looks back with a cool, knowing stare



Photo © Alex Williams

Collecting environmental samples from an active penguin colony on Ardley Island. These kind of samples can be prone to human contamination, so we wear disposable gloves and forensic-style suits. Masks are also worn when working around the penguin colonies. This is a preventative measure against the transfer of potentially infectious agents between penguins and humans (and vice versa).



Walking through the snow may look fun, but when it reaches knee height this can become quite challenging. The challenge is further increased when transporting heavy equipment like the inflatable boat used for lake coring.



Photo © Alex Williams

Sometimes described as ‘vultures of the Southern Ocean’, the giant petrel is an imposing bird with a wingspan that can exceed 2m.



Photo © Alex Williams

Ardley Island has a largely uninterrupted wild landscape, however, there are a few simple shelters which can be used by researchers to cache equipment and take refuge from the elements. Two of the Argentinean refuges are pictured.

Snow & Ice

The primary goal of this expedition was to collect sediment cores from two lakes.

Ardley lake (above) is near the site of a long since abandoned penguin colony. Today, penguin activity is concentrated in a different part of the island.

Yanou, also known as Tern Lake (below) is on King George Island and has no recorded history of concentrated penguin activity. This is our control site.

When we visited, both lakes were partially thawed. This complicated sediment core collection.



Photo © Martha Ledger



Photo © Martha Ledger

What Lies Beneath?

Successful lake sediment coring requires experience, careful preparation, and some luck.

Working as a team and guided by Dr Roseanna Mayfield, we navigated toward the deepest part of the lakes. This is the ideal place to take undisturbed cores. However, because of thick ice, sometimes we could not get to the very deepest spot. Compromise is often a feature of field work.

Nonetheless, we successfully collected our target number of cores from both lakes.

We also collected water samples for chemical analysis.



Photo © Eduardo J. Pizarro



Photo © Eduardo J. Pizarro



Photo © Eduardo J. Pizarro



Photo © Alex Williams

A curious Adélie penguin seems curious to see us



Maxwell Bay is visited by large research vessels, military ships and cruise ships. Yet, they were dwarfed by towering icebergs which calve from nearby ice sheets. During our stay, these icebergs would languish lazily in the bay– we saw them slowly melt day–by–day.



Photo © Alex Williams

Elephant seals are a common encounter around King George Island. However, you have to be careful, because despite their size, when they are resting, they can easily be mistaken for a large boulder. These playfully sparring seals were easy to spot.



Photo © Alex Williams

A tern skims along the shore after successfully hunting a tasty treat.



One of our last tasks on King George Island was to locate a colony of chinstrap penguins. Knowledge sharing is an important part of making fieldwork a success. We are grateful for the help provided by Diego Reyes-Thomas from the University of Chile and FAVET. Diego showed us the route to the chinstrap colony. Along the way, there were many seals, including an Antarctic fur seal.



A Rocky & Windswept Home

After trekking for over an hour we arrived at the chinstrap colony.

Much smaller than the gentoo nesting sites on Ardley Island, the chinstraps had found a secluded corner of King George Island.

After waiting for several roaming adult penguins to leave fresh guano, we were able to collect our final samples and head back to the research station.

This marked the end of our fieldwork campaign.





Photo © Roseanna Mayfield

The PathoPast field team (left to right): Drs Alex Williams, Martha Ledger and Roseanna Mayfield

Project PI and Ambassador: Alex Williams

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