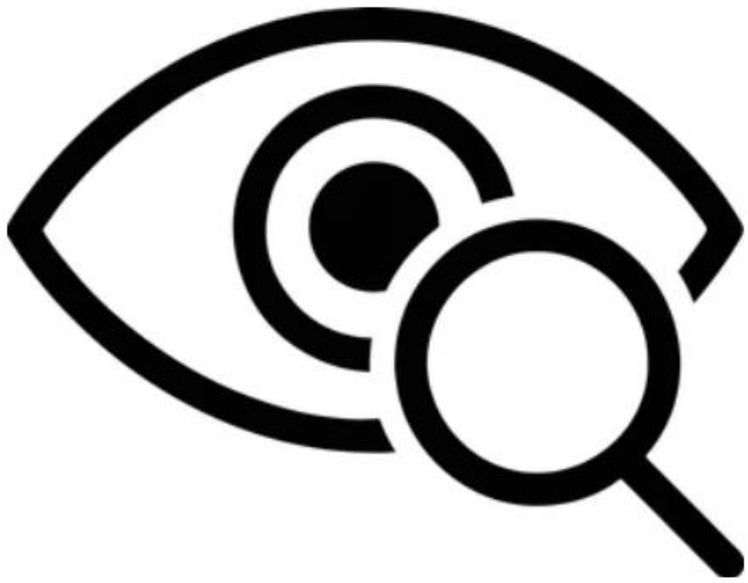
ROOM GUIDE · LARGE PRINT

Room 2

Palaeontology

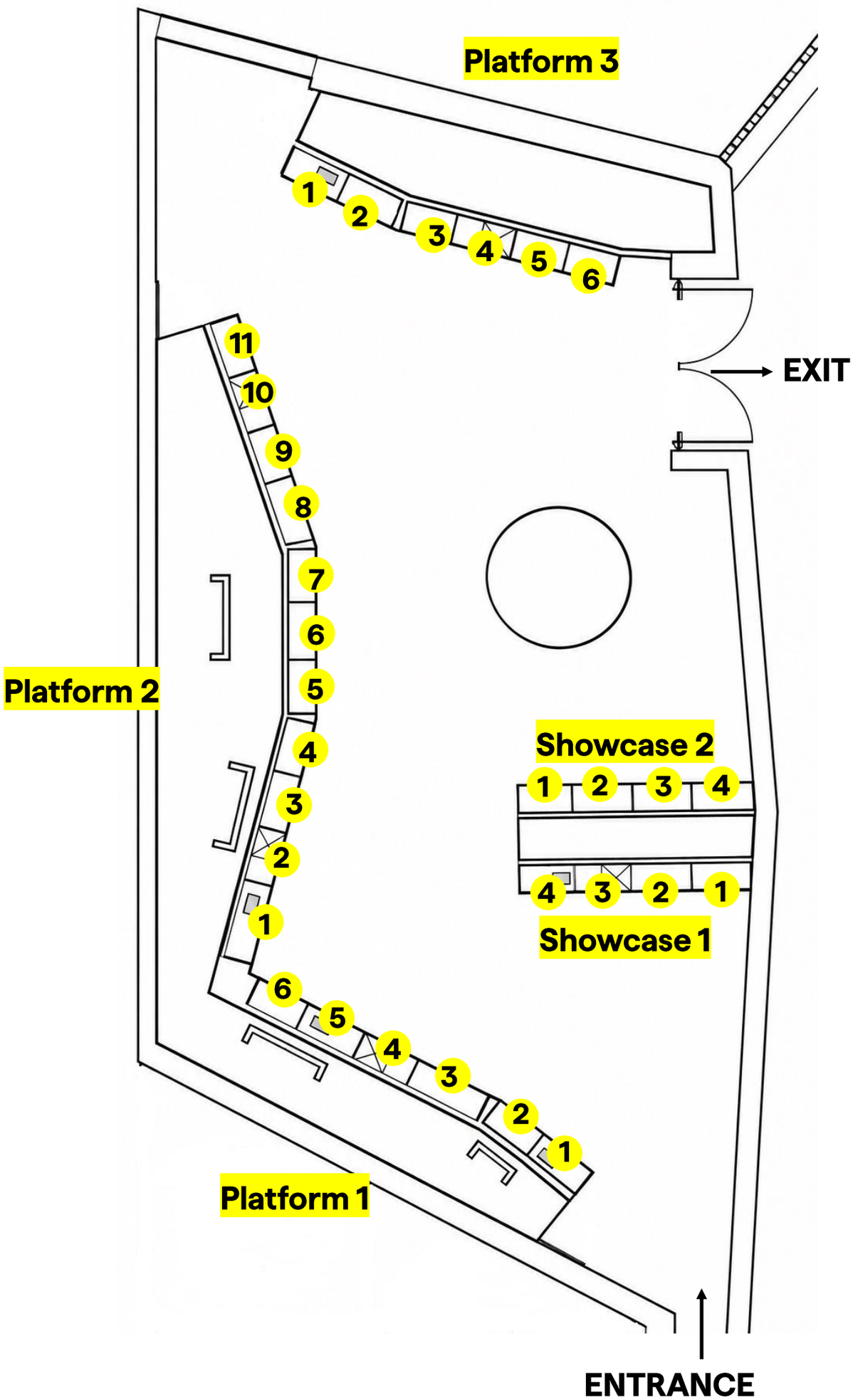


Fossil biodiversity

A story written in rock

Hundreds of millions of years ago, the territory we inhabit today began to form along the coast of the ancient continent of Gondwana. Over time, it became home to a great diversity of plants and animals. Their traces help reconstruct the planet’s palaeontological history.

Room 2 plan


Platform 3
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EXIT
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Platform 2
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Showcase 2
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Showcase 1
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Platform 1
ENTRANCE

Showcase 1

1. Living planet

Earth’s first inhabitants

Around 3.8 billion years ago, Earth was an unstable, lifeless planet. Massive volcanic eruptions, constant earthquakes, small continents in formation and an oxygen-free atmosphere shaped the landscape. In this environment, the first living organisms appeared: single-celled microbes.

How can we see the invisible?

Although single-celled organisms are microscopic, they can leave visible traces. Stromatolites are among the oldest examples, formed in layers —or strata— through microbial activity.

2. Immortal mortals

What are fossils?

Fossils are remains or traces of past life preserved through physical and chemical changes after being buried in

sediment. They can be microscopic, like single-celled organisms, or very large, like some dinosaurs.

Types of fossils

They can be classified as:

- **Body fossils**

  Parts of an organism preserved through mineralisation or replacement of the original material.
- **Moulds and casts**

  The organism's external or internal shape preserved after the original material has disappeared.
- **Trace fossil**

  Footprints and other marks left by living organisms.
- **Preservation in amber**

  Organisms trapped in plant resin that later fossilises.

3. Form and impression

The most common fossils

Depending on fossilisation conditions, remains may leave impressions, form internal moulds as sediment fills cavities,

or become body fossils when minerals replace the original material.

4. The process

A small miracle

Most organisms have soft bodies that decompose quickly unless buried in sediment. Under the right conditions, physical and chemical processes can preserve their remains.

- **1 Death of the organism**

The animal's body settles on the sediment.

- **2 Rapid burial**

New sediments then cover the body. The lack of oxygen slows decomposition.

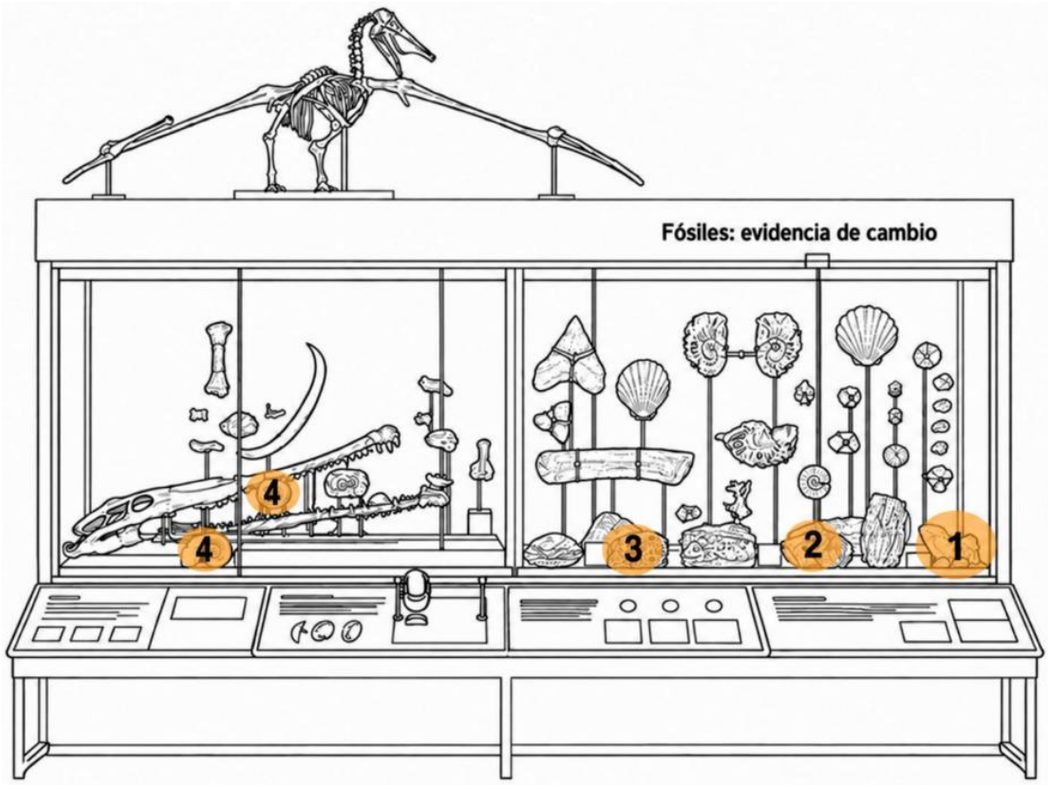
- **3 Preservation of hard parts**

The minerals in the bones are gradually replaced by more stable minerals.

- **4 Exposure**

The mineralised remains may eventually become exposed and discovered.

Featured collections



1	**Spherical oncolitic stromatolites** Parina–Redonda palaeolake Late Pleistocene–Holocene, Cenozoic
2	**Fossil leaves preserved by carbonisation** | Tracheophyta indet. Lebu? Group Palaeocene-Eocene, Cenozoic
3	**Cavities made by rock-boring bivalves** | *Gastrochaenolites* isp. Bahía Inglesa Formation Neogene, Cenozoic
4	**External moulds of ammonite shells** | Ammonoidea indet. Lautaro Formation Jurassic, Mesozoic

Platform 1

Landscapes of another world

Fossils from a distant past

Atacama's palaeontological history begins around 370 million years ago, when organisms left traces in the rock. Since then, life has diversified, disappeared and evolved into the forms we know today.

(538–251 million years ago)

1. First stop: the Palaeozoic

The revolution of life

This era began with the Cambrian Explosion, the greatest recorded diversification of life in Earth's history. Environmental changes allowed simple life forms to evolve into more complex organisms. By the end of the era, oceans and continents supported a great variety of life.

- Atacama's earliest fossil record dates to the Devonian.

2. The Devonian

The union that formed the territory

Around 400 million years ago, Chile as we know it did not exist. Its formation began as large blocks of continental crust moved in from the ocean and joined the western edge of what is now South America. Chilean territory gradually formed like a mosaic, through the addition of many fragments.

Plants of Atacama

Early witnesses

A fragment of Haplostigma furquei is displayed here. The small dots visible through the magnifying glass mark where the leaves were attached, showing that they densely covered the stem. This plant belongs to the lycophytes, one of the earliest groups to develop water- and nutrient-conducting tissues, roots and simple leaves.

The Devonian extinction—360 million years ago

At the end of this period, around 70% of species in equatorial regions disappeared. The most likely cause was glaciation in Gondwana, which lowered temperatures and sea levels.

3. The Carboniferous around the world

The photosynthesis revolution

After the Devonian extinction, humid forests spread across the continents. Insects, amphibians, reptiles and early synapsids —ancestors of mammals— thrived, while photosynthesis raised atmospheric oxygen and fuelled the spread of life.

New developments

A global view

New forms of life appeared and diversified during this period, and may also have lived in Atacama, although no fossils have been found.

- Marine inertebrates such as trilobites were abundant in the sea.
- Plants grew to great sizes.
- The first winged animals —insects— appeared.
- Cartilaginous fish dominated the world's oceans.

4. Local life in Atacama

Between land and water

At the time, northern Chile already formed a continuous coastal strip, although much of it remained underwater, so most fossils are marine. Atacama is an exception: traces of invertebrates and land vertebrates —including amphibians, reptiles and synapsids, ancestors of mammals— are among the oldest records of these groups in South America.

5. Palaeontology in action

From fossil track to animal

Reconstructing an animal from its traces combines science, art and technology. Footprint size, shape and depth, together with the rock and its environmental clues, are compared

with living species and other fossils. From this evidence, specialists and artists recreate the animal's body, skin and even possible colours.

- The distance between its limbs helps estimate the size of its torso.
- No belly marks suggest it did not drag its body.
- No tail marks suggest it had a short tail.
- Toes without claws suggest it was an amphibian.

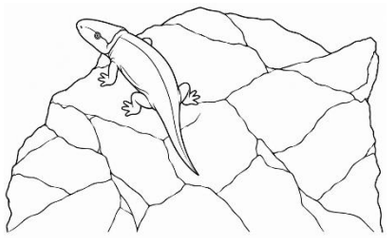
6. Subtle traces

Other finds

The same rock formation also preserves trace fossils made by small animals such as millipedes, worms and aquatic relatives of woodlice.

- Palaeontologists identified the lines and grooves in these fossils as traces left by ancient millipedes and worms, preserved for over 300 million years.

Featured collections



Eryopid amphibian | Eryopidae indet.

Eryopid amphibian track | *Limnopus* isp.

Reconstruction

Quebrada Colorado | RM.1.98

Around 300 million years ago, Quebrada Colorado in Tierra Amarilla was a water-covered valley. There, an amphibian left tracks in the mud, marking the transition to land.

Permian

Research in progress

So far, only one rock formation in Atacama is known to contain fossils from this period: the Llanos de Chocolate Strata. It preserves ancient marine remains, including shelled invertebrates similar to clams but from a different group. Their distant relatives still live in deep waters off Atacama.

Platform 2

(251–68 million years ago)

1. Second stop: the Mesozoic

The breakup of a megacontinent

At the start of this era, Pangaea dominated the planet, surrounded by the ocean Panthalassa, which covered areas now part of Atacama. Tectonic movement gradually broke it apart, and 186 million years later it had split into Laurasia in the north and Gondwana in the south.

> **(250 million years ago) The Permian extinction**
>
> Around 70% of terrestrial life and 90% of marine life disappeared in the largest extinction in Earth's history. Massive volcanic eruptions are thought to have altered the climate and warmed the planet.

2. Triassic

The language of leaves

After the Permian extinction, Earth entered a period of recovery. Pangaea's continuous landmass allowed plants to spread widely, so the same fossils are now found on distant

continents. One example is the seed fern Dicroidium, found in South Africa, India, Australia and South America, including Atacama.

(200 million years ago) The Triassic extinction

Around 76% of species disappeared, allowing dinosaurs to dominate terrestrial environments. The most likely causes were the breakup of Pangaea and intense volcanic activity.

3. New discoveries

Plants and more

Recent Triassic discoveries in Atacama are changing what we know about this period. They include rare land fossils such as cockroaches and beetles, aquatic life such as fish, ammonites, crustaceans and molluscs, and some of South America's oldest ichthyosaur records.

Exceptional preservation

In the Atacama foothills, the El Mono Strata are among the best-preserved and most promising research sites in Chile and the Southern Hemisphere. Their fossils allow the first

relatively complete reconstruction in Chile of an environment from the early breakup of Gondwana. Rarely preserved insect wings and fish scales are especially notable.

4. Ocean fossils

Far from the coast

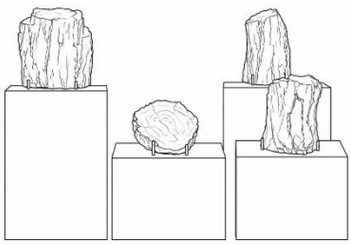
During the Triassic, the sea repeatedly advanced and retreated over areas now inland. It entered through the Huasco Valley and Gulf of Taltal, flooding places such as Chañaral and El Salvador. These changes are recorded in sediments and fossils now found far from the coast.

The end of the Triassic

New species

Around 50 million years into the Triassic, another mass extinction —linked to the early breakup of Pangaea— altered the climate and oceans. Many lineages disappeared, including marine reptiles, while ichthyosaurs declined sharply. On land, mammal relatives also declined, allowing dinosaurs to dominate the Jurassic.

Featured collections

	**Group of fossil trunk fragments** | Tracheophyta indet. La Ternera Formation The specimens on the platform come from trees that produced naked seeds, like modern pines and araucarias. Fossil leaves are displayed to the right, while the wall shows the palaeoenvironment they lived in.
11	**Frond of an extinct plant** | *Kurtziana paipotensis* La Ternera Formation On loan from the National Museum of Natural History | SGO.PB.1435
15	**Ginkgo leaf** | Ginkgoales indet. La Ternera Formation On loan from the National Museum of Natural History | SGO.PB.1546

5. The Jurassic

The Pangaea revolution

At the end of the Triassic and beginning of the Jurassic, rising heat inside Earth thinned the crust, opening fractures that allowed magma to rise and Pangaea to begin breaking apart.

By the middle Jurassic, it had split into Gondwana and Laurasia, creating new seas and the emerging Atlantic Ocean. Changing ocean currents reshaped environments and life.

The Coastal Range

As old as the dinosaurs

During the Early Jurassic, around 200 million years ago, tectonic movements uplifted parts of the Chilean coast. A chain of volcanoes gradually formed the Coastal Range, while a shallow marine basin remained inland.

6. Marine species

The protagonists

Around the world, the Jurassic is known for dinosaurs on land and the appearance of the first birds. In Atacama, much of the fossil record formed underwater, with abundant ammonites and bivalves alongside marine reptiles such as plesiosaurs and ichthyosaurs.

Time without a clock

In Atacama, *Weyla* is an index fossil that helps determine the relative age of rocks. Its presence indicates an Early Jurassic age.

Saltwater fossils

The wall in front of you shows animals that lived in Atacama's Jurassic sea. Some still have living relatives. Weyla and modern scallops, for example, are both bivalves with two-part shells. Weyla lived partly buried in sand, while scallops can propel themselves through the water by opening and closing their shells, almost as if flying underwater.

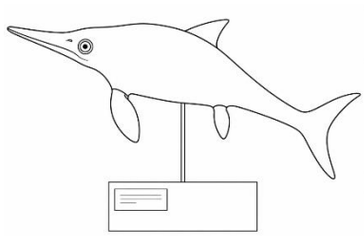
7. Giants of warm waters

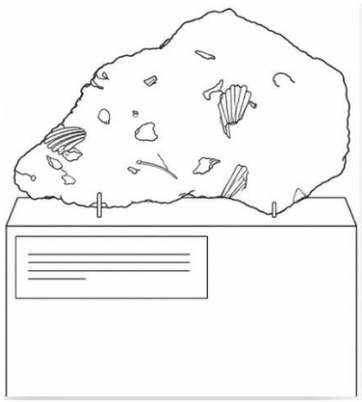
The Jurassic in Atacama

Ocean basins favoured the fossilisation of invertebrates, like those on the map, and vertebrates such as ichthyosaurs and plesiosaurs. These large reptiles dominated Mesozoic seas but did not survive into the Cenozoic.

- Plesiosaurs appeared in the Late Triassic and diversified into long- and short-necked forms, occupying different niches in ancient oceans.
- Solitary corals do not form colonies or build the solid structures that stabilise coral reefs.
- Sea lilies are related to modern starfish. Their fossils often appear as small “stars” that once formed part of the stem.

Featured collections

4	**Group of extinct sand scallops** | *Weyla* sp.
5	**Group of ammonites** | Macrocephalites sp. | Teloceras sp. | Ammonoidea indet. | Perisphinctidae indet. Lautaro Formation
7	**Fragment of ammonites** | *Arietites* sp. Lautaro Formation
	**Reconstruction of a large-eyed ichthyosaur** | *Ophthalmosaurus* sp. A Jurassic dolphin? No. Ichthyosaurs were reptiles and dolphins are mammals, but both

	evolved similar body shapes for life in the sea. The artist therefore based the replica's skin texture and colour on modern marine mammals.
	**Matrix with extinct sand scallop** | *Weyla* sp. Lautaro Formation Fragment of marine sediment found near Pinte, in Alto del Carmen, containing invertebrate remains such as Weyla alata, an extinct scallop.

8. The Cretaceous

The new southern continents

During this period, Laurasia and Gondwana completed their separation, which had begun in the Late Triassic. South America became isolated from North America, allowing many species to evolve independently and diversify.

- The greatest change between the Jurassic and Cretaceous in Atacama was the retreat of the sea, giving way to continental environments.

A new palette of colours

Worldwide, the earliest angiosperm —flowering plant— fossils date to the Early Cretaceous. In Atacama, however, they do not appear until the Palaeogene, around 100 million years later, although they are recorded elsewhere in South America, including other parts of Chile, from the Cretaceous onwards.

9. Witnesses of change

Subtropical coast

At the beginning of the Cretaceous, a warm sea flooded the basin between the still-forming Coastal Range and the continental margin of South America, much as it had during the Jurassic. Over time, the sea retreated, leaving sediments that preserved fossils of nautiloids, ammonites and gastropods, or snails.

Cerro La Isla

A “mountain” of fossils

This palaeontological site lies in the district of Tierra Amarilla, in the Andes. Its lagoons, estuaries, rivers and dunes were once home to land crocodiles, pterosaurs and dinosaurs.

10. Playing with tracks

Steps on dry land

Some Cretaceous dinosaurs left footprints in the sediment, including sauropods and ornithopods. Only pterosaur bones have been found here, but tracks from elsewhere help reconstruct what their footprints looked like.

Pterosaurs. The abundance of fossils suggests these flying reptiles formed colonies, evidence of social behaviour.

Ornithopods. Herbivorous dinosaurs that could walk on two or four legs.

Theropods. These carnivorous dinosaurs walked on two legs, and most left tracks with three visible toes.

11. Cretaceous discoveries

Dinosaurs in Atacama

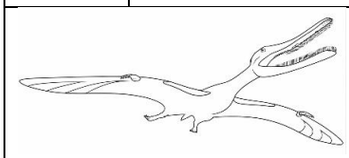
Although most local fossils are marine, several sites preserve dinosaur tracks and remains, along with evidence of flying reptiles and crocodiles, making them promising sites for future discoveries.

Little titan... A great discovery

A new group of dinosaurs thrived during this period: titanosaurs. Two species have been described in Chile so far: Arackar licanantay in Atacama and Atacamatitan chilensis in Antofagasta.

Featured collections

1 - 2	**Fragments of corals and bryozoans** | Scleractinia indet. - Bryozoa indet. Chañarcillo Group - Nantoco? Formation
6	**Rock replica with a ornithopod dinosaur** | Ornithopoda indet. Quebrada Descubridora

7	**Rock replica with a theropod dinosaur** | Theropoda indet. Cerro La Isla
	**Pterosaur reconstruction |** Ctenochasmatidae indet.

The K-Pg extinction

Around 80% of species disappeared, including non-avian dinosaurs. Evidence suggests that a large asteroid impact altered the climate and affected life on Earth.

Platform 3

(68 million years ago–today)

1. Third stop: the Cenozoic

The plates... again

At the beginning of this period, North and South America were already separate, while South America was still connected to Antarctica. Tectonic activity continued to raise major mountain ranges, including the Andes, Alps and Himalayas. Once again, shifting continents and changing ocean currents transformed life.

2. The Palaeogene

An ocean apart

At the beginning of this period, a tropical sea separated South and North America, linking the Pacific and Atlantic and their species. To the south, South America remained connected to Antarctica by land until this link disappeared around 30 million years later.

Almost an island

Unique species

Fossils from much of the Cenozoic show that South America had a distinctive fauna. With little or no exchange between continents, animals evolved independently. While primitive horses and camels lived in North America, South America was home to lineages such as armadillos and land crocodiles.

3. The Neogene

The moment of connection

Around three million years ago, the Isthmus of Panama completed the land connection between South and North America. This bridge allowed species to migrate in both directions, creating the Great American Biotic Interchange and mixing animals that had evolved separately for millions of years. Off Chile's Pacific coast, cold, nutrient-rich upwelling intensified, a precursor to the Humboldt Current that supported the great diversity recorded in the Bahía Inglesa Formation.

- During the Neogene, uplift of the Andes accelerated, contributing to the aridification that formed the Atacama Desert.

Cold waters off the coast of Caldera

The microfossil *Globigerina calida* coils its shell to the left in cold water and to the right in warm water. Specimens from the Bahía Inglesa Formation therefore indicate a cold current in northern Chile since at least the Miocene, more than three million years ago.

4. Reconstruction

From fossil to animation

On the wall is a replica of one of the whales found at Cerro Ballena, near Caldera, scanned before recovery. Some skeletons were nearly complete and found belly-up with articulated parts, suggesting they died at sea from poisoning during a red tide.

5. Bahía Inglesa Formation

A South Pacific ecosystem

The area around Caldera is one of Atacama's richest fossil zones: even the town and its surroundings sit on ancient marine deposits. Fossils include molluscs, fish, birds and marine mammals, as well as shark teeth, sperm whales, marine sloths, dolphins and several types of seals, including a dwarf seal.

"We are South American rockers"

A world-class site

During the expansion of the Pan-American Highway (2010–2012), Cerro Ballena was discovered: an exceptional concentration of cetacean fossils around six million years old. More than forty whale skeletons and other marine fossils were found there.

6. Fossil treasure

A paradise for science

At Los Dedos Palaeontological Park, twelve kilometres south of the city, thousands of fossilised bone fragments reveal an ancient sea teeming with life. Abundant plankton likely fed large schools of fish and attracted many of the animals whose remains we see today.

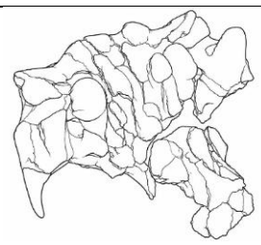
Palaeontology in Atacama

Preserve to learn

Every fossil contains information and, together, they help reconstruct Atacama's biological and geological history. Before study, fossils are cleaned, freed from surrounding sediment and, when needed, strengthened with resin to prevent fractures.

- The Caldera community, aware of the heritage value of its fossils, is committed to preserving them and has turned replica-making into an art.

Featured collection

	Posterior section of a whale skull in its plaster jacket | Balaenopteridae? indet. Bahía Inglesa Formation
	**Posterior section of a small whale skull** | *Piscobalaena cf. nana* Bahía Inglesa Formation
	Conservation container 127 Viviendas Collection Bahía Inglesa Formation

Showcase 2

The Neogene sea

Around seven million years ago, a great diversity of animals lived in the sea off Atacama, in a landscape and climate similar to those of today.

1. A day like today... seven million years ago

The South Pacific coast teemed with life, much like today, thanks to abundant food in the sea. More than thirty species of sharks, rays and chimaeras lived alongside fish, crocodiles, penguins, boobies, cormorants, pelagornithids, seals, dolphins, whales and even aquatic sloths.

- *Pelagornis chilensis* was one of the largest birds ever to exist, with a wingspan of up to six metres. Instead of teeth, it had bony projections along its beak, probably used to catch and hold slippery prey such as fish.

2. Neogene animals

A more familiar world

Fossils from the Bahía Inglesa Formation and Los Dedos Park reveal a highly diverse marine fauna. Although many species became extinct, several lineages still have living relatives, including Humboldt penguins, tuna and albatrosses. Some fossils also represent animals now found at other latitudes, such as tropical marlins and capybaras, typical of warmer rivers and wetlands.

Atacama's "Ark"

The sea and its incredible diversity

Nearly 300 palaeontological finds have been identified at over seventy fossil sites across Atacama. This rich fossil record helps reveal past environments, climates, food webs and how they changed over time.

3. Show me your teeth

And I’ll tell you who you are

These fossils can reveal an animal’s identity and life history. Chemical analysis can indicate its diet, reconstruct its environment and reveal possible migrations between cold and warm waters.

Form and function

Shark teeth vary with diet: pointed teeth grip slippery prey, while serrated edges cut and tear flesh. Rays have flat dental plates for crushing food.

4. The Quaternary

Welcome to the modern world

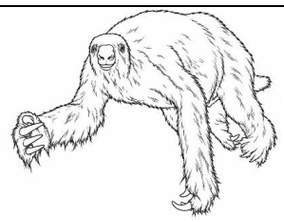
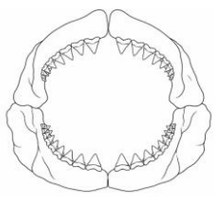
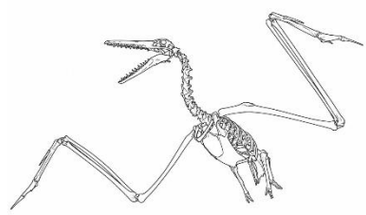
Repeated glaciation and ice retreat reshaped Chile’s landscape, forming rivers, broad valleys and today’s coastal terraces. Atacama’s sea supported marine life very similar to that of today, providing evidence of ecosystem changes over the past several hundred thousand years.

Humboldt Current

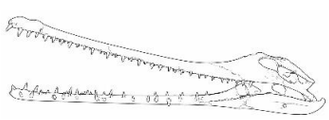
Feeding frenzy

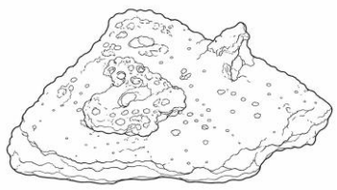
As this current became established, marine fauna changed and many species disappeared from Chile's coast. It's cold, nutrient-rich waters attracted new species and created food webs that largely persist today.

Featured collections

	**Marine sloth reconstruction** | *Thalassocnus* RM.1.95
	**Megalodon jaw reconstruction** | *Otodus megalodon* RM.1.97
	**Pelagornis skeleton reconstruction** | *Pelagornis chilensis* RM.1.96

Featured collections in the display case

	**Marine gharial model** | *Piscogavialis* Bahía Inglesa Formation Neogene, Cenozoic | RM.1.102

	**Starfish** | Asteroidea indet. Bahía Inglesa Formation Neogene, Cenozoic | MURAT.3.26.32
	Whale | Mysticeti indet.
1	Whale radius
11	Whale rib
	Bahía Inglesa Formation
	Penguin | *Spheniscus* sp.
15	Beak fragment
18	Humerus
19	Tibiotarsus fragment
	Bahía Inglesa Formation
	Pelagornis | *Pelagornis cf. Chilensis*
23	Beak fragment
24	Tarsometatarsus fragment
	Bahía Inglesa Formation
28	**Eagle ray dental plate** | Aetomylaeus sp.
	Formation Bahía Inglesa | SC127- 0401
33	**Marine worm burrows** | Sabellaridae indet.
	MRA-50101

Script, curation and coordination

Exhibitions Department

Subdirección nacional de Museos

Museo Regional de Atacama

Atacama Region,

January 2026

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