Google Arts & Culture

# Learn Anywhere: Dinosaurs

In association with LEXICON

Field Museum, T-Rex Illustration, American Museum of Natural History

# How to use this lesson plan

This plan takes you on an exciting journey with plenty of links through to amazing online content so no need to print. This lesson plan is suitable for anyone but we recommend it for ages 7 to 11. It's a lot of fun to go on this journey with parents, teachers or your friends, but it is designed so you can explore independently at your own pace. There are different types of questions to answer: can you discover, explore and invent? We think so.

Check in with your parents or teacher if you need to, but you'll need a tablet, computer or smartphone. You can do this *Learn Anywhere* lesson on almost any device as long as you can get online and use a web browser.

There are 3 Chapters:

Chapter 1 - Dinosaurs Discovered 45 minutes
Chapter 2 - Fierce Facts 60 minutes
Chapter 3 - Extra Discovery 45 minutes

You'll see some helpful signs on the way:

Useful information to guide you through the lesson.

Things you'll need to watch, read, learn and make things with during the lesson.

Digital activity time. Take quizzes and explore.

Estimated time to do a section of this lesson.

Explore online content. Discover videos, stories, or go and look at and zoom around pictures.

Activity time. This is where you get to design, make or write something of your own.

Headphones to listen to videos and audio.

# Things you'll need

Things that will help you during this *Learn Anywhere* lesson.

**Scrap Paper**

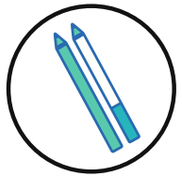
**Plasticine or Modelling Clay**

**Brush and Paint**

**Tablet or Computer**

**Scissors**

**Notepad**



**Pens and Pencils**

Welcome to ***Learn Anywhere: Dinosaurs***

In this *Learn Anywhere* lesson, you are going to learn all about dinosaurs. Discover for yourself how legends of monsters became reality when the first fossilised bones were discovered. You will investigate their bodies, teeth and claws. Hunt for facts and details and then design the perfect dinosaur for yourself. Get ready to investigate...

**What will you do?**

1. Go on an adventure to discover the secret history of dinosaurs. Where they came from. Where are they now? Who discovered them?
2. Then you will hunt for facts and secrets that very few people know about dinosaurs.
3. You'll design a dinosaur of your own using digital apps, paper and pencils/pens, or make one out of modelling clay or craft materials around the house.

**What will you learn?**

1. What is a dinosaur?
2. Are dinosaurs still alive?
3. What size are dinosaurs?
4. What do dinosaurs eat?
5. What dinosaur has the most powerful bite?
6. What do herbivore, carnivore and omnivore mean?
7. How many dinosaurs can you name?
8. Who discovered dinosaurs?

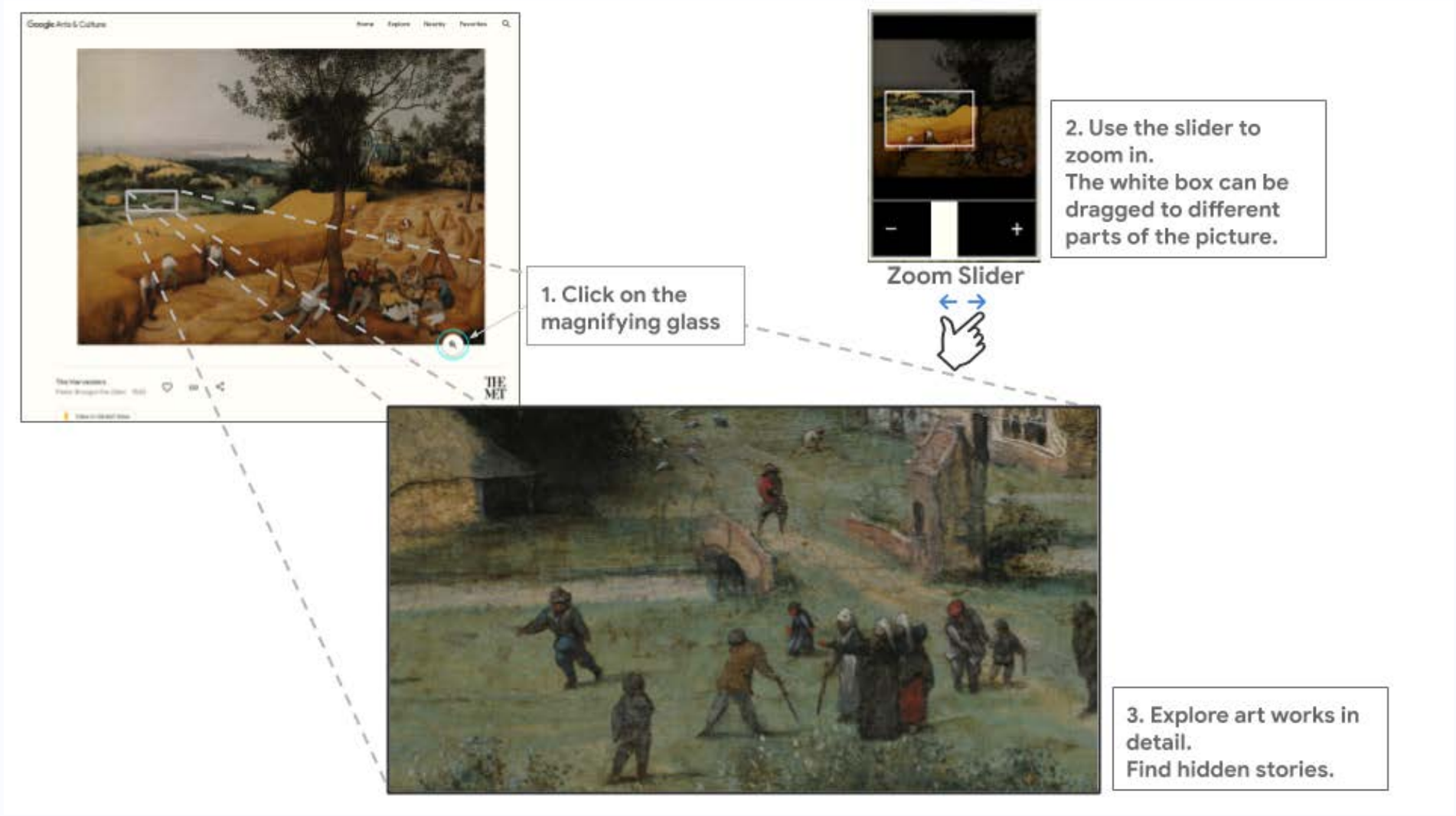
**After studying this lesson, you will be able to:**

1. Describe and identify the different features of dinosaurs including size, skull, teeth and claws.
2. Understand the difference between a herbivore and a carnivore.
3. Design the perfect dinosaur for you, using art and design techniques.

**Vocabulary:** Archaeopteryx lithographica, carnivore, claw, Cretaceous, dinosaur, Diplodocus carnegii, extinction, fossil, herbivore, Iguanodon, Jurassic, Megalosaurus, meteor, museum, omnivore, Oviraptorosaur, palaeontologist, Plesiosaurs, prehistoric, Psittacosaurus, Rhomaleosaurus, teeth, Titanosaur, Triceratops, Tyrannosaurus rex (T-Rex), Velociraptor.

There’s one more thing to know before you go on your lesson. Google Arts & Culture pictures are big. So big that you can zoom in. Explore. Sometimes right down to the feather.

So you just need to click on a link, then on the Magnifying Glass symbol and zoom in with the Zoom Slider. Drag the white box around and you can explore the picture. You’ll find out for yourself. Here’s an example of a Google Arts & Culture picture and the zoom slider.



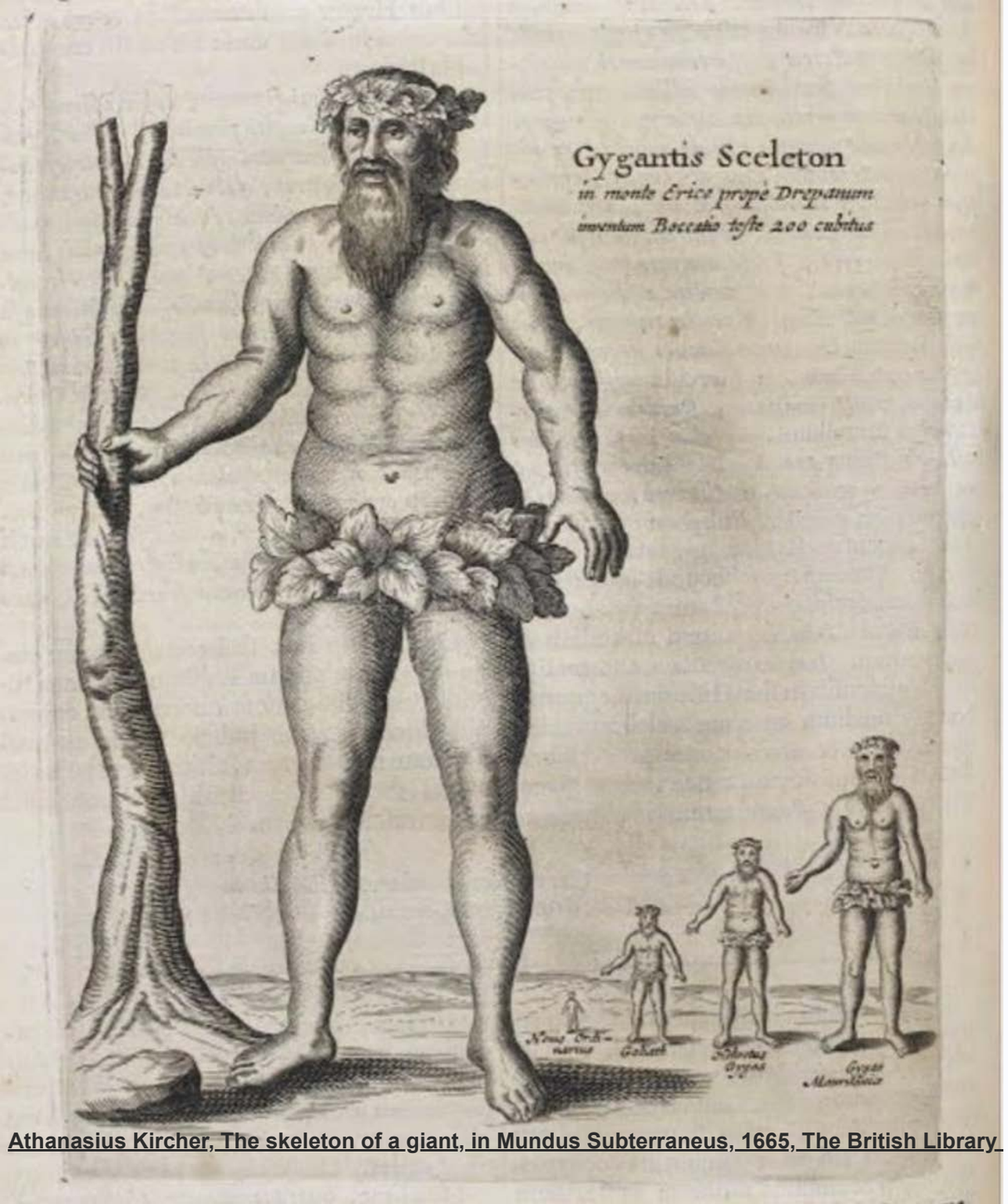

**Pieter Bruegel the Elder, The Harvesters, 1565, The Metropolitan Museum of Art**

# Chapter 1

What's this chapter about?
Dinosaurs Discovered

What will I do?
Explore the myths and legends of the 'terrible lizards'
Learn some awesome facts and take a quiz

How long will this chapter take?
45 minutes




Athanasius Kircher, The skeleton of a giant, in Mundus Subterraneus, 1665, The British Library

Since humans have told stories, there have been legends of giant creatures, with great claws, fangs and scaly skin. Legendary beasts, which humans named “dragon”.

They were dismissed as fantasy and myths. Stories from nightmares.  Until one remarkable discovery, which changed everything.

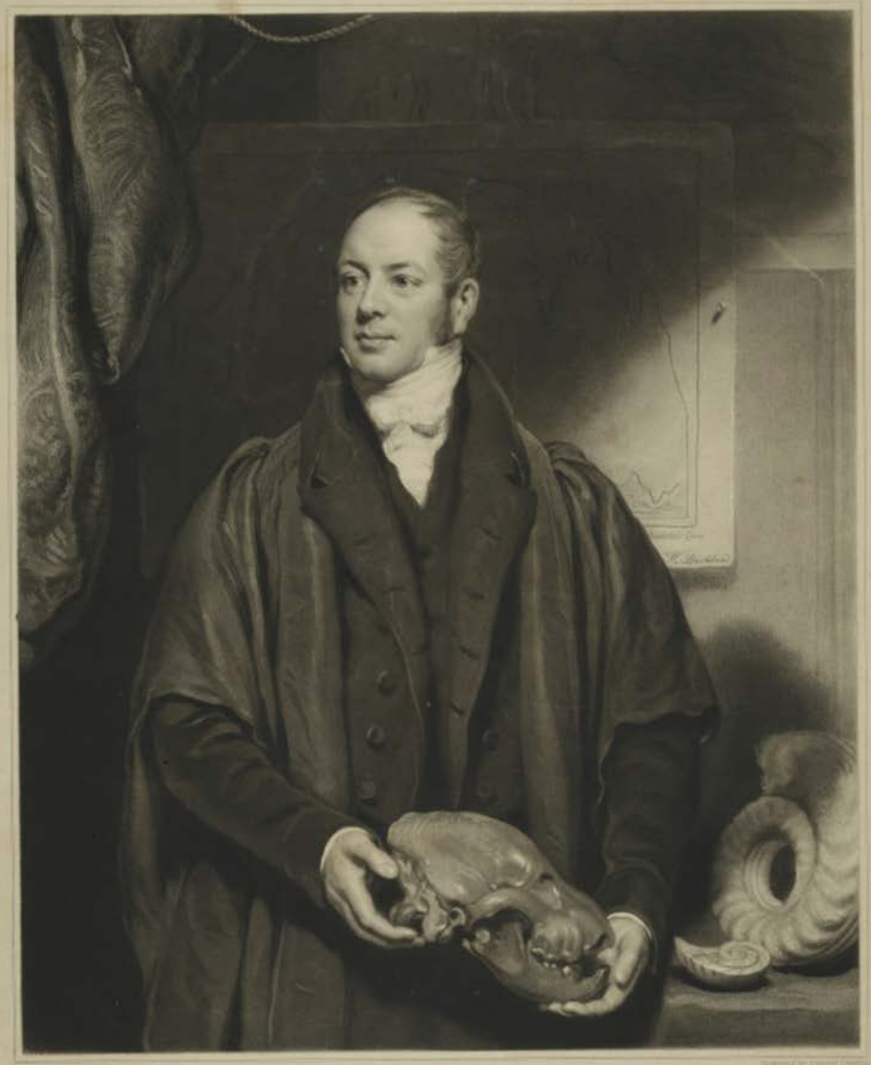
In 1677, Robert Plot, Professor of Chemistry at Oxford University, was out looking, as first ‘keeper’ of the Ashmolean museum, for things that interested him from around Oxford in England.

He found a huge bone, so large that he thought was from the thigh of a giant, a lost species of monstrous man.

Others had discovered strange, giant bones before him, wondering which giant man or beast it came from.

Plot was a careful man and recorded what he had found. His discovery waited for someone to come along and unlock its true meaning. Plot did not know it but his discovery would help change our understanding of the world we live in.

Click here to explore an example of giants.



Molteno and Graves (publisher), Cousins, Samuel (engraver) and Phillips, Thomas (artist), The Reverend William Buckland, D.D. F.R.S., 1883, Science Museum

In 1815, William Buckland, the first Professor of Geology at Oxford University, looked again at Professor Plot's discovery. The mystery got even more exciting.

Revisiting Plot's walk, Buckland found that nothing had changed in nearly 130 years. He investigated Professor Robert Plot's site of discovery, digging, he unearthed the rest of the skeleton.

It was not a giant man. It was a giant 'monster'.

Buckland was astonished and delighted. He knew that perhaps this never before seen thing, this huge creature, and others like it could be the origin of some of those legends of dragons and monsters.

It was a terrifying and fascinating sight. Studying it carefully for nine years, brilliant Buckland knew he had uncovered a great secret – its teeth, its legs, its jaw… all told him one thing.

This was a monstrously large lizard. A hunter, a predator that killed and ate other animals. With its great size, how big must the animals it killed have been? He concluded that it was like no known species. It was extinct. He had uncovered a new era of the planet Earth. An era of giant creatures, just as our legends suggested.

He called his creature "Megalosaurus".

Click here to see Reverend Buckland in more detail.


Warman, Students viewing dinosaur skeletons, Cretaceous Dinosaur Hall, 1966, American Museum of Natural History

People became fascinated with the discovery of Megalosaurus, and the quest began to discover more. And they did.

These were monstrous creatures from the past that needed a name. One man realised that they were different from anything seen before. Distinctive. That man spent his life obsessing about the bodies of living things. He became known as a genius on the subject of the living world. His name was Sir Richard Owen. He began to collect the fossils as they were brought in from all over the world to London.

Finally, in 1842, the brilliant and sometimes difficult genius, Sir Richard Owen, named the fossils, “dinosauria”, meaning “terrible lizards”.

He became world famous and, in 1881, created the Natural History Museum to house the remarkable discoveries pouring in from adventurers across the world. He knew these discoveries were from one special species: dinosaurs.  A perfect name.

The roar of a dead species of monster that humans had perhaps glimpsed the bones of for thousands of years and wondered, in fear, what they were. The mighty dinosaur was reborn in our world. Dead, yet alive in our imaginations. Where they always had been.

The next page takes you on a journey to learn seven awesome facts about dinosaurs. Be prepared, there's a quiz at the end so take notes.


Click here to learn your awesome facts.
How many can you remember?

## Awesome facts quiz

Question 1: What does the name dinosaur mean?
Answer: A. Terrible Lizard B. Giant Meat Eater C. Ancient Carnivore D. Monstrous Coldblood

Question 2: What was the name of the period when dinosaurs first appeared 231.4 million years ago?
Answer: A. Cretaceous B. Jurassic C. Triassic D. Silurian

Question 3: Which dinosaur was more intelligent that most other dinosaurs?
Answer: A. T-Rex B. Brontosaurus C. Velocirator D. Triceratops

Question 4: What is thought to have caused the mass extinction 66 million years ago, that saw the end of the dinosaurs?
Answer: A. Humans B. Pollution C. Meteor strike D. New predators

Question 5: In which period do fossil records show that dinosaurs evolved into birds?
Answer: A. Jurassic B. Cretaceous C. Devonian D. Triassic

Question 6: Which creature ruled the seas, if the dinosaurs ruled the land?
Answer: A. Crocodiles B. Giant Squid C. Plesiosaurs D. Sharks

Question 7: What is the name of the dinosaur thought to be the missing link between dinosaurs and birds?
Answer: A. Pterosaur B. Velociraptor C. Archaeopteryx lithographica D. Deinonychus

You can scribble your answers on some paper - the correct answers to this quiz are at the end. No peeking.

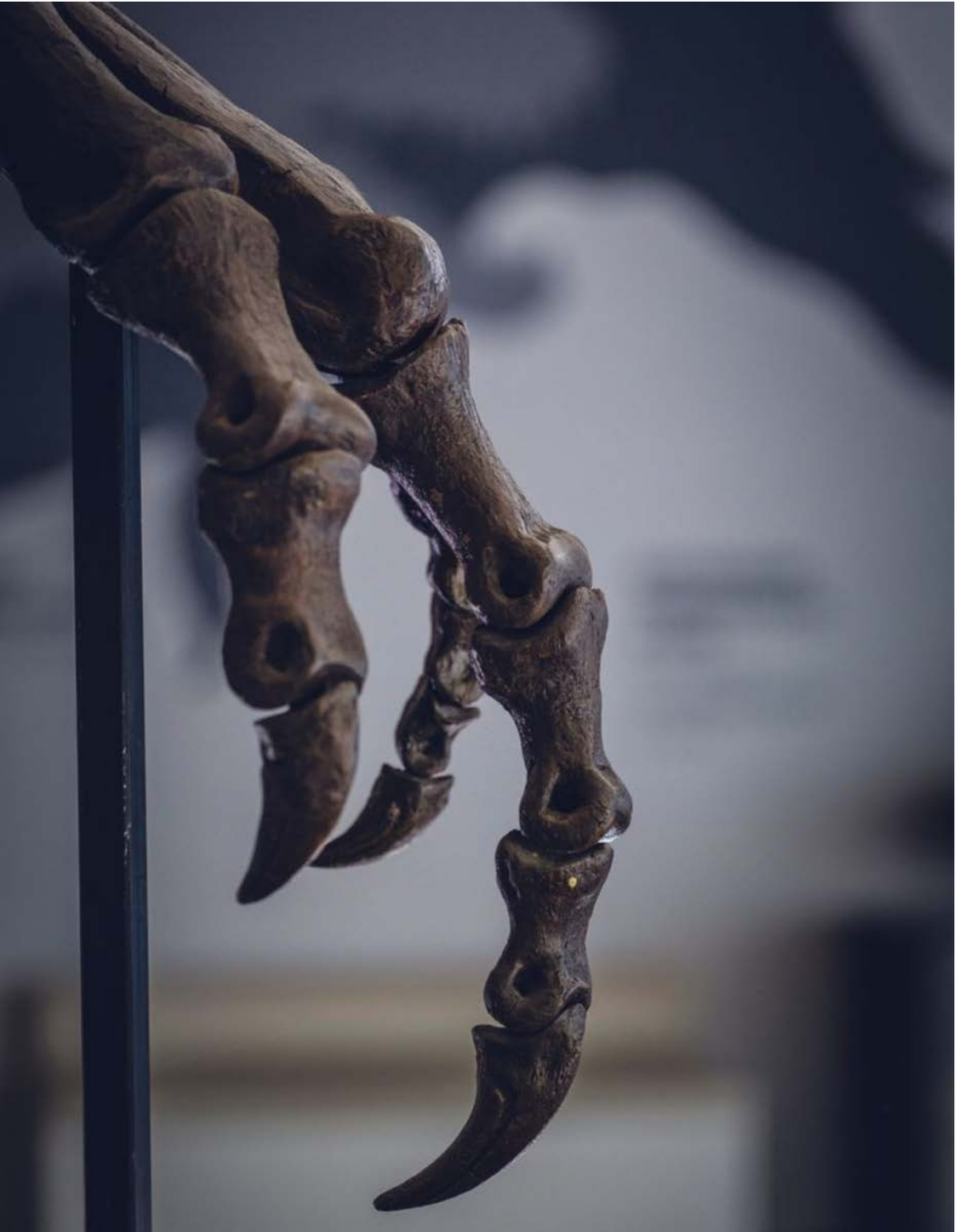
# Questions for Chapter 1

Let's finish the chapter with some questions. When you **Discover**, you are comprehending and remembering. When you **Explore**, you are really able to understand it and think it through. When you **Invent**, you are able to comprehend, understand, remember, analyse and do something cool with your new knowledge.

**Discover:**
What is the most interesting thing you have learned in this chapter?

**Explore:**
Why do you think it is important that paleontologists find dinosaur fossils?

**Invent:**
Why is it important to understand the past?



# Chapter 2

What's this chapter about?
Fierce Facts

What will I do?
Explore the differences between dinosaurs
Pick your favourite dinosaurs
Write about or draw a dinosaur you would like to discover

How long will this chapter take?
60 minutes

Click here to see a video clip of the reconstruction of a Diplodocus Carnegii dinosaur. You'll see time go into reverse, as the Diplodocus gets organs, muscle and skin back again. Diplodocus was a plant-eater, known as a herbivore. It did not eat meat, just like a cow or a deer. The Diplodocus was long, approximately 33.5 metres. It had a long, whip-like tail which could have been used for defence and also as a counterbalance for the long neck.

Diplodocus carnegii as seen in the Jurascope (Video), Museum für Naturkunde

Click here to come face to face with a Jurassic giant. Explore inside a 360º video story in your web browser, about the famous Brachiosaurus brancai. This dinosaur now has a new name: Giraffatitan brancai. You will see the dinosaur come to life and can click and drag to move around and discover all about the Giraffatitan's ecosystem, and how it resembles modern Giraffes. The original bones of Giraffatitan are mounted in the Museum für Naturkunde Berlin, forming the highest mounted dinosaur in the world. Don't forget to unmute your sound.

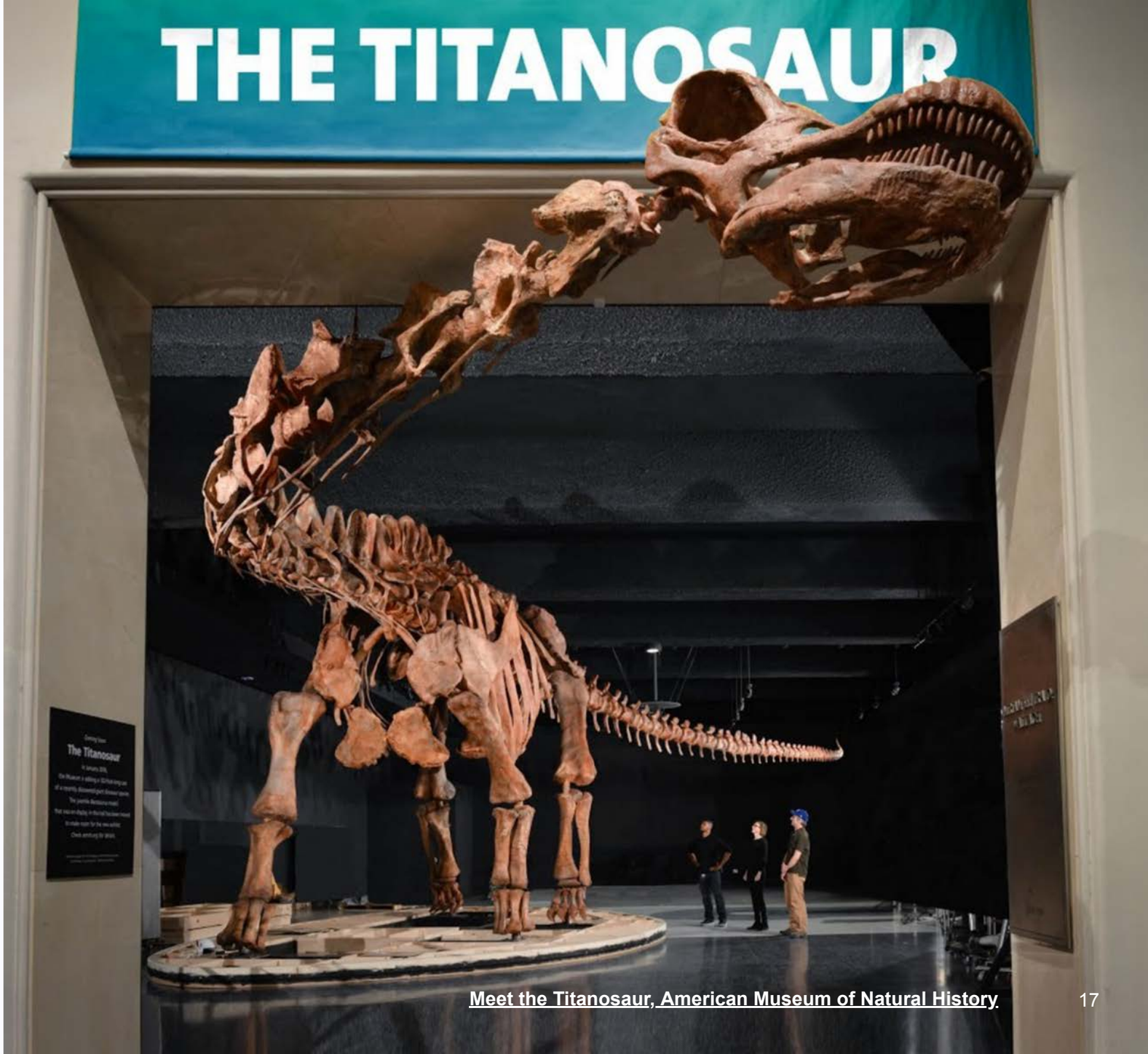
Brachiosaurus / Giraffatitan – Back to Life in 360º (Video), Museum für Naturkunde

Another giant was Titanosaur. It was 6 metres from the ground at its shoulder. Like the Diplodocus we saw earlier, it was a herbivore.

There are various theories about the gigantism of dinosaurs, such as environmental factors like high oxygen levels in the air, and lots of food, but the reason is still unclear for the large size of some dinosaurs. It remains one of our biggest mysteries. If dinosaurs ever met us, they might wonder why we were so small...

Click here to see a 3-minute video of how a Titanosaur skeleton was found and assembled.

Why do you think some dinosaurs grew so big?




Meet the Titanosaur, American Museum of Natural History

Sebastian Chesek, Psittacosaurus, American Museum of Natural History

From the very big to the very small.

Some dinosaurs were on a human scale or even smaller. One successful little dinosaur, Psittacosaurus, lived from 145 million to 66 million years ago, and has been realistically reconstructed because of well-preserved fossils.

We know about the dinosaur's skin colour, large eyes for good vision, feathery strands along the tail, how it walked on two legs. It was about 50 kilograms, the weight and height of a big dog, today. It had skin that camouflaged it, because it was a herbivore and would have been hunted by bigger carnivores.

It was probably an intelligent dinosaur, because of its large brain, with adaptable paws.

Click here to zoom into a very life-like reconstruction of little Psittacosaurus.

Click here to find another little dinosaur, a cousin to the infamous Tyrannosaurus Rex.

Big. Fast. Deadly. The most famous of all carnivorous predator dinosaurs, with a biting force likely to be the strongest of any creature that has ever lived. It has captured our imaginations and inspired countless films, books, comics and more.
The Tyrannosaurus Rex. T-Rex.

Click here, to see up close a T-Rex skeleton.

Click here for the amazing story of Tristan the T-Rex.

Zhao Chuang, courtesy of Peking Natural Science Organization.
Tyrannosaurus Rex, American Museum of Natural History

Based on the fossil evidence, T-Rex was 12 metres long and about 6 metres tall.

Its skull was massive compared to its body at 1.5 meters tall with a muscular neck to support it. The jaw’s teeth were serrated, which means like the edge of a knife, and shaped to rip through skin and muscle.

It had powerful thighs for chasing prey and its powerful tail will have helped it move speedily and with balance. Hunting through the trees and green lands around river valleys in what is now North America.

We know from fossil evidence of its dung, that T-Rex cracked and ate bones along with muscle. Even on very large herbivore dinosaurs like the Triceratops.

Field Museum, T-Rex Illustration, American Museum of Natural History

Doug Henderson, Triceratops, American Museum of Natural History

T-Rex and Triceratops were well-matched.

Triceratops was 7.5 metres long with a massive skull, three sharp horns and a strong shield of bone at the back, it was like a living tank.

Imagine a scary looking three horned giant rhino, and you might be close.

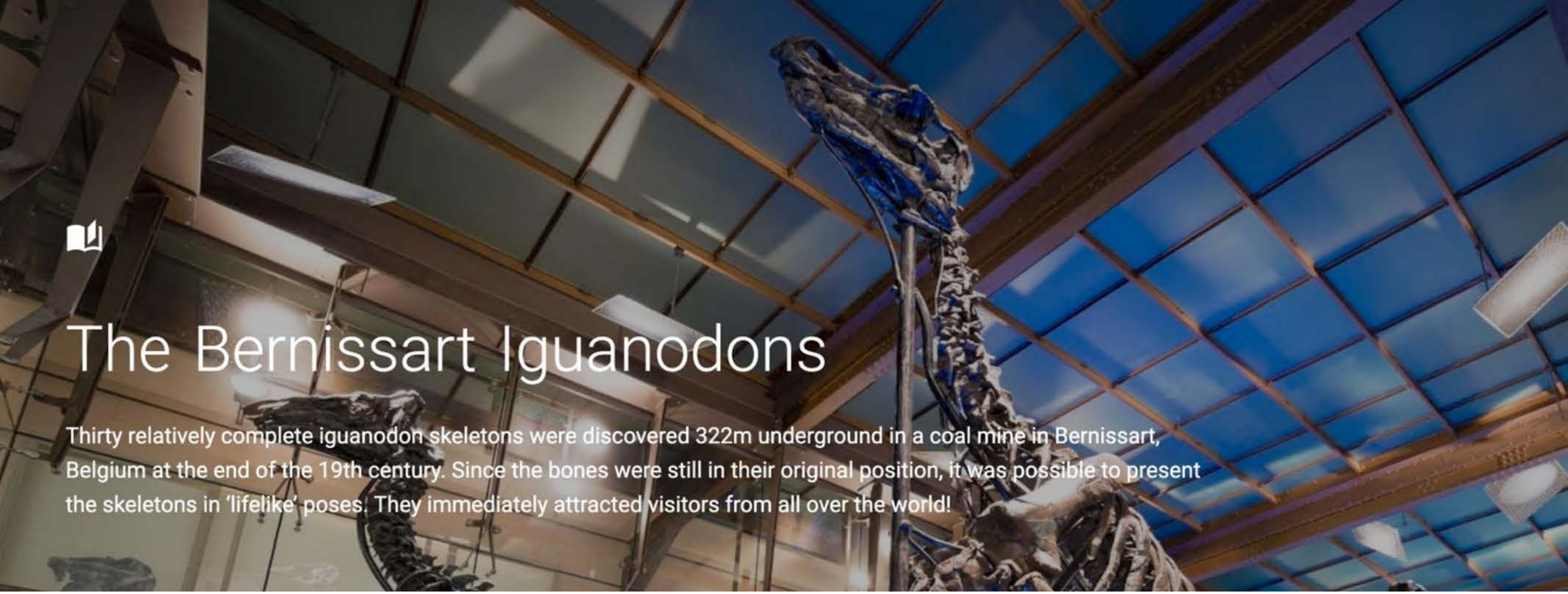
Triceratops was a powerful creature and sometimes T-Rex did not survive its battles against it. Certainly the Triceratops would have put up a good fight, to survive.

Many were killed and eaten by T-Rex, but the Triceratops had evolved to eat plants, it was a herbivore. You can tell by its beak-like snout and smaller teeth evolved to slice and chew plants.

It had nearly 800 teeth in its mouth, pushing out old teeth and growing new teeth to eat through ferns and tough vegetation.

Click here to visit the Natural History Museum's fun dino directory to find out more about all your favourite dinosaurs.

Which are your top five? There are no right or wrong answers but why not think about why you've picked them and write down your reasons.




Some dinosaurs have captured the imagination nearly as much as the T-Rex and one is the Iguanodon.

Doctor Gideon Mantell became a great competitor with Sir Richard Owen. The Mantells were talented and Gideon’s wife, Mary Ann, was a celebrated scientific artist. That was unusual for women in the 19th century.

It seems that Mary Ann stumbled across large tooth-shaped fossils on the side of a road. Bringing it to her husband’s attention, they began to investigate and launched an excavation at a quarry, Whiteman’s Green, near Cuckfield in Sussex. They unearthed a remarkable find. A new species, unknown to humankind.

A huge iguana-like dinosaur creature that they called the ‘Iguanodon’.

For years the Mantells researched the fossils. An artist, John Martin, visiting their house in Brighton in 1834, was inspired by the sight of the fossilized skeletons to create an amazing picture: The Country of the Iguanodon.

His picture appeared in Mantell's book on his discoveries The Wonders Of Geology, in 1838. Pictures and news of the Mantells' discoveries amazed the world and made the Iguanodon one of the earliest dinosaurs to become world-famous.

Click here to explore the stunning display of the Bernissart Iguanodons.

If you could discover a new dinosaur, what would it be? Draw or write a description. There is no right or wrong answer - it's your dinosaur.

John Martin, Country of the Iguanodon, 1837, Te Papa

# Questions for Chapter 2

Time for some questions. Here's a reminder of how it works. When you **Discover**, you are comprehending and remembering. When you **Explore**, you are really able to understand it and think it through. When you **Invent**, you are able to comprehend, understand, remember, analyse and do something cool with your new knowledge.

**Discover:**
What is the difference between a herbivore and a carnivore?

**Explore:**
Why did some dinosaurs become gigantic?

**Invent:**
What are the advantages for dinosaurs who are really large or really small?

# Chapter 3

What's this chapter about?
Extra Discovery

What will I do?
Explore some extra facts about dinosaurs
Take the Dino Challenge
Design and make your own dinosaur

How long will this chapter take?
45 minutes

Rhomaleosaurus, Natural History Museum

When the dinosaurs ruled the land, other sorts of giant creatures ruled the oceans, like this predator from 180 million years ago, called Rhomaleosaurus.

See the Rhomaleosaurus come back to life and swim right by you, in Virtual Reality. Just use your tablet, phone or computer browser and move with him as he roams the Natural History Museum's Fossil Marine Reptiles Gallery.

Discover how it lived, moved and what it looked and sounded like, and find out why studying long-extinct creatures helps scientists better understand species living today.

Click here to go on an amazing virtual adventure.

Do you remember discovering the Oviraptorosaur?

It's a dinosaur but looks just like a bird.

Dinoaurs are very much alive all around us - birds are their direct descendants.

Click here to explore the history of Archaeopteryx lithographica – the fossil link between dinosaurs and modern birds.

Head over to the Natural History Museum's **Is It A Dinosaur?** interactive quiz challenge. Click here to try the quiz.

**Zhao Chuang, courtesy of Peking Natural Science Organization, Oviraptorosaur, American Museum of Natural History**

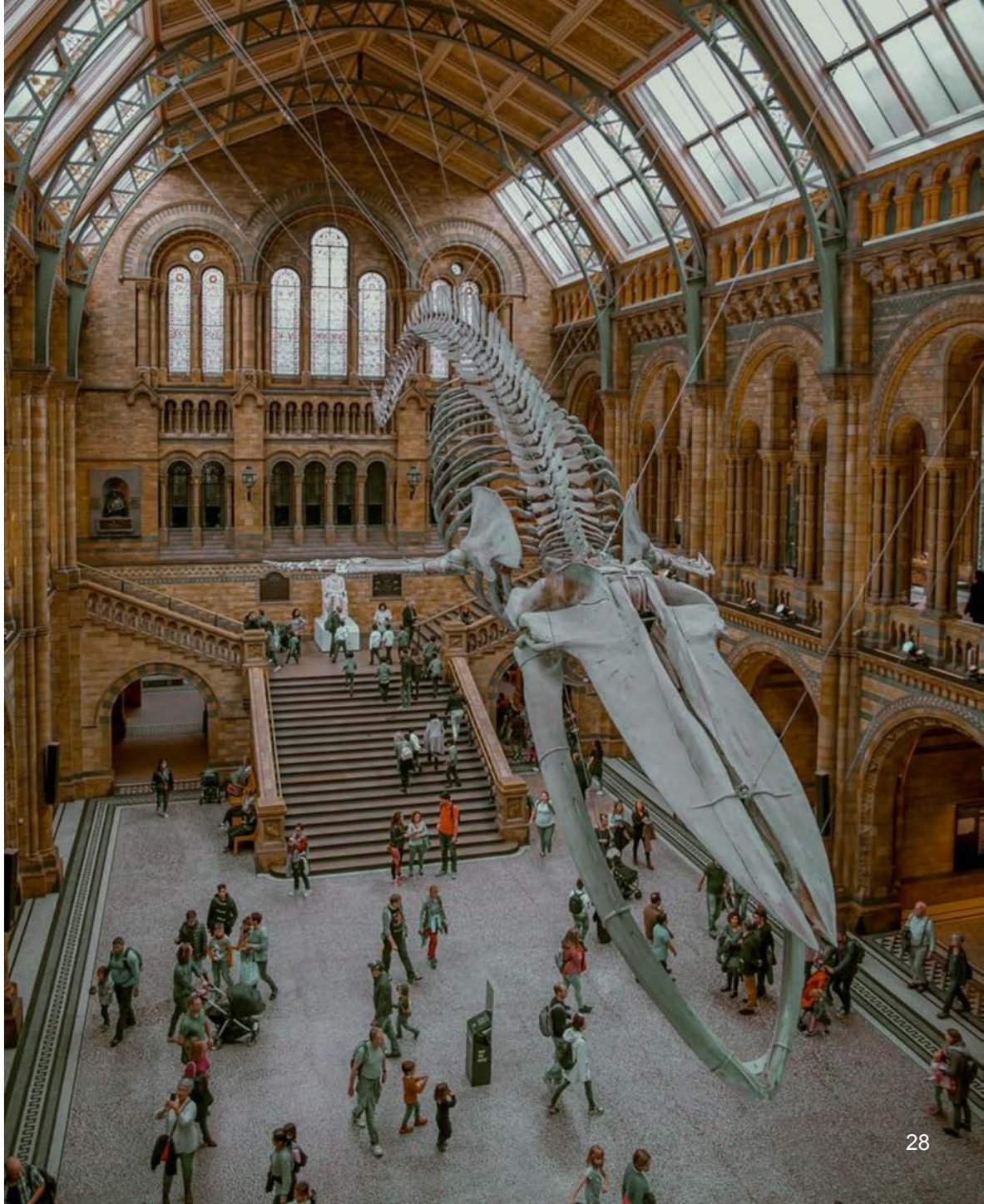
# Questions for Chapter 3

Time for some questions. Here's a reminder of how it works. When you **Discover**, you are comprehending and remembering. When you **Explore**, you are really able to understand it and think it through. When you **Invent**, you are able to comprehend, understand, remember, analyse and do something cool with your new knowledge.

**Discover:**
What creatures ruled the seas while dinosaurs lived on the land and what was their nickname?

**Explore:**
Can you think of animals that exist today that look like the dinosaurs you've discovered?

**Invent:**
Think about everything you've learned and decide which things you feel make a perfect dinosaur. Now that you have your perfect dinosaur, you can create a piece of art to show how you've been inspired.
Draw or paint, either on paper or digitally, your perfect dinosaur.
If you have modelling clay, plasticine or want to make a papier mache model, you can make a small sculpture of your dinosaur.



Congratulations. You have proven yourself an inventive dinosaur student.

Continue your journey into natural history here.

Zhao Chuang, courtesy of Peking Natural Science Organization, Khaan, American Museum of Natural Museum

# Answers to all the questions

## Chapter 1

### Answers to quiz

Question 1: What does the name dinosaur mean?
Answer: A. Terrible Lizard

Question 2: What was the name of the period when dinosaurs first appeared 231.4 million years ago?
Answer: C. Triassic

Question 3: Which dinosaur was more intelligent that most other dinosaurs?
Answer: C. Velociraptor

Question 4: What is thought to have caused the mass extinction 66 million years ago, that saw the end of the dinosaurs?
Answer: C. Meteor strike

Question 5: In which period do fossil records show that dinosaurs evolved into birds?
Answer: A. Jurassic

Question 6: Which creature ruled the seas, if the dinosaurs ruled the land?
Answer: C. Plesiosaurs

Question 7: What is the name of the dinosaur thought to be the missing link between dinosaurs and birds?
Answer: C. Archaeopteryx lithographica

Discover: What is the most interesting thing you have learned in this chapter? Answers may vary.

Explore: Why do you think it is important that paleontologists find dinosaur fossils? They can help us understand the past and the world we live in now.

Invent: Why is it important to understand the past? Answers may vary, e.g., understanding the past can help understand the future and think about the future.

# Answers to all the questions

## Chapter 2

Top five exercise:
Answers may vary but reasons for selecting them should be clear.

Drawing exercise:
Answers may vary but should take account of correct dinosaur characteristics.

Discover: What is the difference between a herbivore and a carnivore?
Answer: A carnivore feeds off other animals, a herbivore feeds off plants.

Explore: Why did some dinosaurs become gigantic?
Answers can vary, e.g., environmental factors, such as high oxygen levels in the air, and lots of food, plus different bone composition, etc.

Invent: What are the advantages for dinosaurs who are really large or really small?
Answers may vary but can relate to collecting food, protection from predators, speed of movement, attack and defence.

## Chapter 3

Discover: What creatures ruled the seas while dinosaurs lived on the land?
Answer: Plesiosaurs.

Explore: Can you think of animals that exist today that look like the dinosaurs you've discovered?
Answers can include birds and reptiles.

Invent: Think about everything you've learned and decide which things you feel make a perfect dinosaur. Now that you have your perfect dinosaur, you can create a piece of art to show how you've been inspired. Draw or paint, either on paper or digitally, your perfect dinosaur. If you have modelling clay, plasticine or want to make a papier mache model, you can make a small sculpture of your dinosaur.
Answers will vary but should take account of correct dinosaur characteristics.