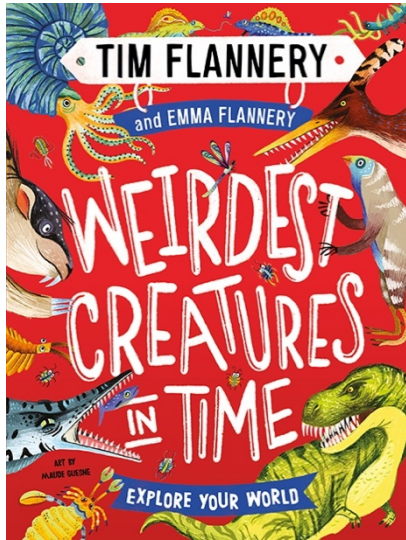


Teacher's Notes



Explore Your World: Weirdest Creatures in Time

Written by **Tim Flannery and Emma
Flannery**

Illustrated by **Maude Guesne**

Teacher's Notes by **Bec Kavanagh**

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LEARNING OUTCOMES

RECOMMENDED FOR

6+ aged readers (grades 3-4)

KEY CURRICULUM AREAS

- Learning areas: Science
- General capabilities:
 - ACSHE050
 - ACSHE051
 - ACSSU075
 - ACSSU073

THEMES

- Ancient (and weird) creatures
- Understanding the past
- Animal facts & anatomy
- Conservation and caring for our world
- Evolution and survival

SYNOPSIS

Weirdest Creatures in Time is the third book in the 'Explore Your World' series, following on from *Weird, Wild, Amazing!* and *Deep Dive Into Deep Sea*. Here Tim Flannery teams up with his daughter Emma Flannery to look at the creatures living on our planet millions of years ago, and all the weird things we know about them.

The book (and these notes) is divided into five sections:

- Concepts
- The Precambrian
- Palaeozoic
- Mesozoic
- Cenozoic

Within these sections, Flannery invites readers to travel back thousands of years 'in our imaginations, at least' to the where and when of the largest, fiercest, most amazing creatures who ever existed. In easy-to-read section, Flannery blends short facts with infographics, personal anecdotes, and longer context pieces to engage readers with the past.



ABOUT THE AUTHORS

Professor Tim Flannery is one of the world's leading scientists, explorers and conservationists. He has held positions in renowned institutions across Australia and internationally, including Director of the South Australian Museum, Visiting Chair in Australian Studies at Harvard University and Distinguished Research Fellow at the Australian Museum. He was named Australian of the Year in 2007. He has published more than thirty books, including the award-winning *Here on Earth* (2010), *The Weather Makers* (2005) and *Atmosphere of Hope* (2015). He is a frequent presenter on ABC Radio, NPR and the BBC, and has also written and presented several series on the Documentary Channel. This is his third book for children.

Emma Flannery is a scientist and writer whose curiosity for the natural world has seen her travel and work in some of its most wild and interesting places. She has explored caves, forests and oceans across most of the globe's continents in search of the elusive fossils, animals and plants that help us understand our planet and who we are in it. With postgraduate experience in geology, chemistry and palaeontology. Emma's research and writing has been published in scientific journals, children's books and a number of museum-based adult education tours. She has worked for and with universities, government agencies and museums. She is the co-founder of Museophilic, an independent curatorial service that has produced programs for the City of Sydney and the Australian Museum, aimed at bringing science to life for a range of audiences. Her passion for science has an infectious and playful enthusiasm that inspires curiosity in children and adults alike. She hopes to continue to produce fun and accessible science communication.

ABOUT THE ILLUSTRATOR

Maude Guesne grew up in a small town not far from Bretagne, in France. She studied graphic design and illustration at Brassart College of Art before embarking on her career in illustration in Paris. Maude has always been passionate about travelling, nature and seeing the world. On her adventures as a travelling illustrator, she has lived and worked in many different places, including Australia, Brazil, Canada, Indonesia, Thailand, Cambodia and Africa. Maude now lives in Groningen, in the Netherlands, where her studio is surrounded by nature, windmills and bikes. Maude is always exploring with a pen or camera and finds constant inspiration in the natural world around her. She loves to draw animals and whimsical characters, and is passionate about using textures and colours to tell stories with her art. Her illustrations are always imbued with a touch of humour and sparkle.

THEMES

At the core, this is a book about the past, and all the weird animals that lived on Earth before we did. But even more than that it is about how and why we study these creatures, and what they teach us about how we live on Earth today. In addition to talking about the past, and the scientific discoveries that we've made over time, this book can be used to start conversations about:

- Extinction events (perhaps in relation to climate change and the future of our present Earth)
- Evolution and survival
- The way the Earth itself has evolved over time



WRITING STYLE

Tim Flannery's writing is straightforward and conversational. Readers of the book will feel that they're being told a story over lunch, rather than being lectured to. His use of creative writing techniques like using humour and interesting characters to engage the reader is a great starting point to talk to readers about how we can make non-fiction interesting.

The book is suitable for all readers, particularly because it breaks up long tracts of text with 'Flannery File' boxes, where he recounts personal anecdotes to bring the facts to life, and 'did you know' bubbles, which offer bite-sized facts to engage with. Readers will be able to drop in and out of the text at their own pace depending on their individual reading levels and areas of interest. Questions scattered throughout give readers (or classrooms) the chance to think about and discuss what they've learnt.

Flannery's conversational tone also demystifies working in museums and will inspire interested readers to think about ways they might get involved with museums in their area to kickstart their own careers!

WRITING ACTIVITY

There are many different ways to present facts in a book. Tim Flannery shows that you can be an expert in a subject and still talk about it in a way that's interesting. This kind of non-fiction draws on many elements of storytelling – like plot and characters and suspense – to keep the reader interested.

Think of something that you know a lot about – maybe it's a sport or a hobby. Write a short informative paragraph that uses one or more of these techniques to make your facts interesting for the reader.

COMPREHENSION QUESTIONS

- What do the animals in this book teach you about who we are now?
- Are you surprised by how much Earth has changed over time? Do you have any predictions about how it might change even further into the future?
- What are some of the challenges Tim has faced in his career? How has he navigated them?

ILLUSTRATION STYLE

Maude Guesne's illustrations are bright, colourful, and mostly realistic. But Guesne uses humour to bring the creatures in the book to life, highlighting some of their weird features or facts about them in occasionally silly ways. Readers might like to talk about the way that this kind of humour is used to help us remember real information, without detracting from the overall accuracy of the images.



CONCEPTS (AND INTRODUCTION)

SUMMARY

This section covers all the terms and techniques that readers will need to be familiar with and understand the concepts developed in the rest of the book. Flannery explains the way that creatures from thousands of years ago become fossils (and how to find them), as well as the difference between common names for things and their scientific names. He also explains the way that our planet's past is measured in geological time, and the periods this is divided into, as well as evolution, and the things that got us from where we were way back then to where we are now.

COMPREHENSION QUESTIONS

- What is a fossil? What kind of rock do you find fossils in?
- What kinds of things can be fossilised?
- What does Tim Flannery say is so special about finding fossilised fish?
- What was so special about the 100-million-year-old pliosaur that was found? What process caused this? What is the pliosaur's name?
- What does *palaeo* mean in Greek? What does this tell you about the word *palaeontologist*? What does a palaeontologist do?
- What information *don't* fossils tell you about an animal?
- What is extinction? Can you think of any animals that are extinct?
- What do geologists study?
- Make a list of new terms you learn in this chapter, with a short sentence next to each of them explaining what they mean.

ACTIVITY

THE PRECAMBRIAN

SUMMARY

In the Precambrian period – 4.5 Billion Years Ago, we learn about the funny looking *Dickinsonia Rex*, and some of the oldest living life forms on earth – from LUCA, our Last Universal Common Ancestor, to the oldest fossils on earth, which can be found in Australia!

COMPREHENSION

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- Why was Earth impossible to live on at the beginning of the Precambrian period?
- What is our oldest common ancestor called? What is it?
- How do we find out about LUCA when there are no fossils of it? How else do we learn about the past?
- Where in Australia can you swim with stromatolites?
- Draw a *Dickinsonia Rex*. Is yours life-size? How big could it be in real life?
- When did you last eat a microbe? What was it in?
- Where else do we find microbes?
- Which word means 'little coin' in Latin? What does this tell you about the creature it describes?
- Have you been to any of the places mentioned in the Flannery files? What did you see there?



ACTIVITY

As you look through the chapter you'll see that many of the scientific names for things describe something about them – how old they are, what they look like etc. Go on a nature walk and collect some interesting stones or objects. Come up with your own scientific names for them based on an element of how they look or feel.

PALAEOZOIC

SUMMARY

This section dives into the Palaeozoic period, 540 million years before the present day. In this period students will learn more about the new and wondrous animals that appeared on Earth during this time. Flannery describes this time as 'eat or be eaten' – the first-time life on Earth revolved around survival of the fittest. This is where we really start to see the benefits of evolution, as creatures evolved to protect themselves, or attack others. This section zooms in on trilobites and introduces a few of the very weirdest ones. Imagine having your stomach sitting on top of your head like the *Actinopeltis globosus*!

COMPREHENSION

- What was the important event that triggered the Palaeozoic period?
- What are some of ways creatures evolved to survive during this time? Can you think of any other examples of evolution?
- What changes occurred in the environment during this time to allow for such an explosion of life on Earth?
- What is the end of the Palaeozoic period called? What did we lose as a result of this catastrophic event?
- What made the *Anomalocaris* such an intimidating predator?
- Why are scientists still debating each other about exactly what happened during these periods? What inventions or discoveries have occurred to help them get closer to the truth?
- What kind of animal is a trilobite? What is unusual about their bones? How many different kinds are there?
- Why do you think animals during this time were so big? What is one of the answers scientists have?
- Are fungi animals or plants? What important job do they do?
- Why do scientists think that some animals ventured out of the ocean?
- Choose three creatures from this section and make note of their scientific name as well as the fact about them that interests you the most. Draw a picture to go alongside your notes. Why is it important for scientific pictures to be accurate?
- What was the Tully Monster named after? If you found a monster, what would it be called?
- Choose one thing scientists don't yet know about one of the animals from this section – like why the *Dimetrodon grandis* had such a fancy sail on its back – and come up with your own theory.

ACTIVITY

When you think about it, evolution allows us (or our DNA) to imagine and become our best selves! Or a version of them anyway. If you could evolve parts of yourself to better fit the world we live in, what would those parts be and why? Draw a picture of your evolved self, and describe how you've changed, and in response to what.



ACTIVITY

If the Great Dying hadn't occurred, life on Earth would look VERY different. Write a story imagining what a day in your life would look like if the creatures from the Palaeozoic period hadn't died. Draw a picture to accompany your story.

ACTIVITY

Why was Mary Anning excluded from scientific discussions around her fossils? Was this fair? How were her discoveries important? Do some research about other significant female scientists and write your own scientific story about their work.

MESOZOIC

SUMMARY

After the 'Great Dying', the Mesozoic period takes us back 252 million years to the age of the dinosaurs. The Mesozoic period looks at the supercontinent, home to dinosaurs of all shapes and sizes.

COMPREHENSION

- What were some of the 'firsts' to occur during the Mesozoic period?
- Which elements of our own Earth started to appear during this period?
- The Mesozoic period ended when a giant asteroid hit Earth. What events did this trigger that ended the period?
- What did the first dinosaur have in common with a pet dog? Can you find any other moments where dinosaurs are likened to dogs to explain something about them?
- How do scientists use teeth to determine what kind of food an animal ate? What would your teeth say about you?
- What is a missing link? What is the missing link between dinosaurs and birds?
- What does the term 'convergent evolution' mean?
- What special feature did the *Diplodocus* have that would help it to know if it had been bitten on the tail?
- How did scientists figure out how fast a *Diplodocus* could move its tail?
- What is so special about the *Timimus hermani*?
- Make a list of the similes the writer uses to help the reader picture the dinosaurs.
- Why haven't we found many *Pterosaur* fossils?
- What are some of the present-day animals we start to see during this time?
- Make a list of five defences that dinosaurs during this time had to keep them safe.
- What does the *Tyrannosaurus rex* have in common with an alligator?
- What is a rudist? Draw a map of where you might find them.
- Flannery calls the behaviour displayed by Edward Drinker Cope 'shameful'. Why do you think he says this?
- Reading the Scientist Stories in this section, why do you think scientists are so competitive?



ACTIVITY

Go to your local museum (or look at their collections online) and take a look at some of the fossils they have there. Make some notes about what you see. Now design an experiment to help you to understand an aspect of the way your fossil creature lived.

ACTIVITY

Choose one of the dinosaurs from this section of the book and do your own independent research project on it. What else do you discover? You might use some of the sections in the book to help guide your research – like what is it named after? What does it eat? What don't we know about it? Where have its fossils been found?

CENOZOIC

SUMMARY

Welcome to the age of the mammal! After the freezing cold that followed the Mesozoic period, the conditions on Earth changed to allow new life to take over. But while these ancient primates might be familiar, they're still pretty different from the animals we know and love! The early years of the Cenozoic saw the emergence of creatures like the woolly mammoth who could survive the extreme cold. But the really exciting thing about the Cenozoic age is that we're in it right now!

COMPREHENSION

- What does 'Cenozoic' mean?
- What are some of the significant developments during this period?
- What data do scientists use to make guesses about the way that extinct animals looked? How reliable are these images?
- Who do you think would win in a fight between the *Tyrannosaurus Rex* and the *Purussaurus brasiliensis*?
- What does biomechanics tell us about these creatures?
- Which creature had the longest teeth in the history of life?
- How do scientists learn where long-dead creatures used to live?
- How many different kinds of humans were alive in the past?
- What is echolocation? What animals use it and for what?
- What does Liang Bua mean?
- What are the parts of a scientific name? Give an example from the book.
- What human behaviour is putting some of these creatures at risk of extinction?
- What are megafauna? Which of the megafauna lived in Australia?
- What do you have in common with the *Smilodon Fatalis*?
- Were Neanderthals as stupid as the stereotypes we see in movies?
- What is an ecosystem? What was special about the mammoth's ecosystem?
- How do scientists think we might be able to bring the mammoth back to life?
- What things can we do to prevent extinction?



ACTIVITY

The Cenozoic period brings us to where we are now but looking back through our past like this shows that there will undoubtedly be more periods to come! Use the information you've found in this book to predict what might come next. You might decide to discuss the next great extinction event or talk about what animals and life on future Earth will look like.

RELATED READING

'Explore Your World: Weird, Wild, Amazing!' by Tim Flannery

'Explore Your World: Deep Dive Into Deep Sea' by Tim Flannery

