

*Aussie*  
**STEM** Stars

# JOHN LONG

Fossil hunter

Written by Danielle Clode



## Teacher Notes

written by

Vanessa Ryan-Rendall

PUBLISHED BY



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# ABOUT THE SERIES

**Aussie STEM Stars** is a fresh and unique series for children and young teens aged 10–13 years that focuses on our Australian STEM heroes. Each book is written by an award-winning children’s author and follows the real-life stories of Australia’s top scientists and inventors, chosen on the basis of their pioneering work. Themes explored in the series include childhood, school, family and formative experiences, what inspired them to pursue their chosen path, how they persevered in the face of challenges and what they have contributed to science in Australia.

## Reason for studying this book

Wild Dingo Press publisher Catherine Lewis is excited about their publication. “These disciplines are more important than ever as we look to our inventors and innovators to solve contemporary problems facing humanity and the planet. Our Aussie STEM Stars series uses narrative non-fiction as a tool for educating children - making it as fun and interesting as fiction books. Our writers are passionate about doing justice to their chosen subjects – and their lives – providing teachers, parents and librarians a wonderful series aimed at encouraging children to develop an interest in STEM at a young age.”

## About the author

**Danielle Clode** grew up on a boat sailing around Australia with her parents and her cat. She has worked as a zookeeper, in museum collections and feeding giant fish at an underwater observatory. She studied at Adelaide University before doing her zoology doctorate at Oxford University studying seabirds in Scotland. She is now an Associate Professor of Writing at Flinders University in Adelaide.

Danielle has written many award-winning nonfiction science books about bushfires, sailing ships, killer whales and nature. She has written three books on Australian fossils including *Prehistoric Giants: The Megafauna of Australia*, *Prehistoric Marine Life of Australia’s Inland Sea* and *Australia’s Amazing Fossils: From Dinosaurs to Diprotodons*.

## About our STEM Star: John Long

**Professor John Long's** love of fossil collecting began when he was 7 years old.

He graduated with a PhD from Monash University in 1984, specialising in Palaeozoic fish evolution and has held positions as a Curator in Vertebrate Palaeontology at the Western Australian Museum and then as Head of Sciences at Museum Victoria, Vice President of Research and Collections at the Natural History Museum of Los Angeles County and is now at Flinders University in Adelaide, South Australia. His main area of research is on the fossil fish of the Late Devonian Gogo Formation from northern Western Australia. It has yielded many important insights into fish evolution, such as *Gogonaspis* and *Materpiscis*, the later specimen being crucial to our understanding of the origins of vertebrate reproduction.

As well as many academic works, he is also an author of popular science books including *The Big Picture Book of Human Civilisation*; *The Short, Tragic Life of Leo the Marsupial Lion*; *Gogo Fish! The story of the Western Australian State fossil emblem*.

# OUTCOMES

Australian Curriculum

## KEY FOCUS AREAS

*Literacy Stage 2–4*

*Science Stage 2–4*

*HASS Stages 2–3*

# OUTCOMES

NSW Curriculum

## KEY FOCUS AREAS

*Literacy Stage 2–4*

*Science Stage 2–4*

*HASS Stages 2–3*

# BEFORE YOU BEGIN READING THIS BOOK

## Front cover

- What do you know about John Long?
- What do you know about fossils?
- What do you know about people who hunt for fossils?

## Back Cover

- Read the blurb. What can you gather about this book from the blurb?
- Why do we need blurbs for all types of books?

## Before you start reading

- Highlight quote on **page v** in the book:

*A detailed knowledge of the past can cool  
the rising heat of the future.*

— John Long

Write this quote on a poster as a class or small group. Ask students to write ideas around the quote as to what it might mean to them. Add to this poster as the book is studied.

- Outline the glossary at the back and how to use it.
- Who is the author of this book? Explore other books and pieces of writing Danielle Clode has written and discuss why she may have been asked to write this book.
- What is the difference between a biography and an autobiography? Explore what this book is and why it is a biography and not an autobiography. Discuss the importance of the STEM Stars series.
- What is narrative non-fiction? Could this book fit into that genre as well?

# KEY PROJECTS

## Key project 1: Dinosaur names

Find out the meaning behind at least 10 different dinosaur names. Explore what the Latin meaning is for some of these dinosaurs, who gave them the name and where they were first discovered.

## Key project 2: Create a timeline of the different geological time periods

Throughout the book we read about different periods represented by the fossils John has found. Find out more about those time periods.

## Key project 3: Study of people from the book - Sir Maurice Mawby, Mr Colin Macrae, Dr Tom Darragh, David Attenborough

Each of these people influenced John Long in some way. Find out more about one of these people and their role, not only in John's world but also in the scientific world.

## Key project 4: Maps

- Find a geological map to see where fossils have been found around the world and the different time periods they are from. An example would be:  
<https://www.popularmechanics.com/science/archaeology/a25395/dinosaur-fossil-map/>
- Find a map about Australian fossils and geology.
- Compare these maps to other types of maps we use: hand-drawn maps (like the one John used in the Kimberley), weather maps, mining maps and landform maps. Find some similarities and differences between these maps. Why do we need all of these kinds of maps to have a better picture of the world we live in. How could scientists use them to plan for a more sustainable future for the planet?

## Key project 5: Reflection on literature

Students can fill in this table as they read to record their ideas and feelings:

Chapter	
In one sentence, explain what this chapter was about?	
What did John Long do and say in this chapter? How did he feel?	
What real life events occurred? Link some dates and extra details to this event.	
New language used	
How has the author made you feel? Think of the language used to create tension, happiness, wonder, anxiety.	

### Reflect on this table after the book has been read

- How did your knowledge change throughout the book?
- How did your feelings change?
- Did how you see the characters change as you learnt more about them?
- What new vocabulary have you learned?



# TEACHING AND LEARNING ACTIVITIES

## Chapter 1

- What is a quarry? Are there any near you? Look for a photograph to see what they look like.
- Draw a sketch of what John can see in the early hours of the morning or what his schoolyard looks like. Use the description in the book to help you.
- How is John's school similar or different to yours?
- Which sporting code are the boys talking about in this chapter? Are these two teams still around today? If so, what are the popular names they are called apart from their actual club names?
- Why do you think that not a lot was known about Australian dinosaurs when John was small? Why was more known about American dinosaurs?
- What is a trilobite? Try to find images of what one looks like as a fossil, and also how scientists think it looked when it was alive.
- List the tools needed to be a fossil hunter, as well as the characteristics you need as a person.

## Chapter 2

- John's mum loved telling stories about her family. Does your family share stories like this? See if you can find some of your own family stories to share with your class.
- What is a geologist?
- How is finding information different for us now compared to how John had to learn about the tooth he found?
- What jobs do John's parents have? Do these jobs still exist today?

## Chapter 3

- What do these sciences study: zoology, botany, chemistry and physics?
- What might an imposing entrance look like? What else can be imposing?
- What do crinoids or sea lilies from the Devonian period look like? Why do you think John thought it was a fossilised centipede?
- Find out what palaeontologists do, apart from digging for fossils?

## Chapter 4

- Find out where Sandringham is, as well as Black Rock and Beaumaris beach.
- We read about Vicki and John leaving home and going to the beach on their own. Do you think this could still happen today?
- What is 'sprawling tea tree scrub'? Do many beaches still have this along the edges of the dunes?
- What is the man holding in the water? Draw what you think this might be and then come up with an explanation of the purpose of the bucket.
- *Pseudaptenodytes macraei* was named after Colin Macrae, but what does *Pseudaptenodytes* mean?
- What is a Megalodon and how does it compare to the sharks of today?
- What do the following words mean: petrified, barnacles, vertebrae?

## Chapter 5

- Why is John's teacher called a sister? What does this mean?
- How was having a teacher like Sister Martin important for John's development in his knowledge and passion about fossils?
- What is a scholarship and why do you think Xavier College has offered one to John?
- Why would a mining building be 99 metres high?
- What do the companies Rio Tinto and BHP do in Australia today?
- Can you find a news article about the discovery of the Coelacanth? Read the article to learn more about how the discovery helped scientists. (e.g. Ancient coelacanth fish species found to live to 100 | KidsNews)

## Chapter 6

- What is a graptolite?
- How do you think you would feel if you found someone underneath a sheet of corrugated iron? Would you do what John and his friend did?
- Why might John find playing cricket boring? Do you agree or disagree?
- John and Tim see a dried head in the museum's 'dungeons'? What could it be?
- List some giant prehistoric marsupials and compare them to today's marsupials.
- What is an eel classified as? Why do you think John wondered about how it could live both in water and out?
- How do competitions for children help them in future? Explore some reasons why entering a competition could help or hinder your future choices.

## Chapter 7

- \$5.25 was a lot of money for John's parents. Why do you think that was the case? Find out what an average person's wage was when John was young.
- What is a pension? What is a milk bar?
- How would your life be different if your parents owned a milkbar?
- Find some images of placoderms and *Bothriolepis*.
- Why did the boys get sick from the water?
- How did you feel as you read the passage where the boys were sick? Which words made you feel these emotions?
- What parts of Australia did the sea once cover?
- How big is a Megalodon's tooth? Why do you think Tim was able to spot it?
- How does Mr Pelchen's phrase, 'Well, as long as you got something,' have various meanings throughout this chapter?

## Chapter 8

- Who is Bruce Lee and which movie did the boys watch?
- Why did John enjoy karate over other sports?
- How do you think this saying can relate to John's life? How about yours or anyone else's life?  
*'If a belt is your goal, you'll quit when you receive it,' one of the trainers told him.*  
*'If knowledge is your goal, you'll never stop training.'*
- Where is Okinawa?
- Find out what movies Richard Norton has been in.
- The author has described John's green belt test in detail. Which words helped you to imagine how he felt in his movements, how he moved and what he was thinking?
- How are Wu Tai Chi and karate the same and different?
- What is a gap year? What do many school leavers do with their gap year?
- Look at the map of Queensland and find where the Gold Coast, Cairns and Cooktown are. How far apart are they?
- What is the wet season?
- Imagine you are John or Tim. Write a series of diary entries about your trip up north.

## Chapter 9

- Find Inverloch on the map of Australia, then find a map of when Antarctica was joined to Australia. What was this continent called then?
- The waves are described as 'hissing angrily'. This is called personification. Can you think of other ways the ocean can be given human characteristics?
- Professor Singleton tells John to study geology as he is more likely to get a job in mining. Why does the professor think getting a job is more important than studying something that you love?
- Who is Tim Flannery? Why is he well known in Australia?
- Find an image of the suckermouth catfish to explore the differences between this fish and other fish you are more familiar with.
- Imagine you are a customer at the pet shop where John asks for the dead fish. Write some thought bubbles to show how different customers might feel.
- Who is David Attenborough? How did he make a difference to how John saw his own work in science?
- Draw up an evolution chart to show how fish have evolved into other species. Why is this important to the story of evolution?

## Chapter 10

- Find Gogo on a map of Australia and work out how far John needs to travel to get there from the University of Western Australia.
- Why has the author called John's future car the 'Gogomobile'? Is a Gogomobile what John needs for this journey? Consider the play on words as you answer this question.
- What is a cassette player?
- Use a five senses chart to imagine you are at Fitzroy Crossing. (See the Appendix.) Then use another for when they are driving through Gogo Station. Compare these two places and how the different settings and the different words used made you feel.
- What does sediment mean?
- Who are they Royal Flying Doctor Service? Why did the team need to tell the Royal Flying Doctor Service where they are?
- Who are the Gooniyandi people? Find out about how they continue to care for the land of their ancestors.
- The group swam in a gorge with freshwater crocodiles. Was this safe? Find out more about crocodiles to answer this question.

- After their car was bogged, John and Andy had to walk for hours to find the nearest highway. A passing truck soon took them to the nearest station. What kind of station would it be in the outback?
- List the different fossils John and his team found, then find a fossil image to match and possibly an artist's representation of what it would have looked like.
- What is a death adder?
- Why do you think that after all of John's great discoveries he still may not find work?

## Chapter 11

- Where are Thailand and Burma?
- What is the Golden Triangle?
- Why did the armed tribesmen leave John and Clive alone?
- Find out where Gantheaume Point is and the footprints that have been found there.
- The Yawuru gave John permission to explore their land. Why is it important that John does this for each of his expeditions?
- Why do you think someone stole the footprint?
- What is a 'black market'? Why is there a black market in fossils?
- Are there any other state fossils in Australia?

## Chapter 12

- Find Antarctica on a map. How often do flights for scientists go there? Can you go there as a tourist?
- Why is Antarctica a place not 'for the faint-hearted'?
- Find some of the books John has written for children and write a book review on one of them.
- Would you like to have a parent who was a palaeontologist? Think about the adventures John's children had with him and how that experience would feel for you.
- Can you find other fossils that have been named after someone?
- What is a tetrapod? What are spiracles?
- Why do you think journalists sometimes get their facts wrong? What does this tell us about the news we read?
- How has technology helped scientists to know more about fossils?
- Write a diary entry imagining you are Kate or John. Describe how you feel as you discover the baby fish then announce it to the world.

## Chapter 13

- Where is Lamington National Park?
- What is your comfort zone? What do you think you could try and do to move yourself out of this 'zone'? How might it help you?
- One of John's roles is to develop stories to tell about the museum collection. Why do stories need to be told when someone views museum objects?
- We read that people are not paid fairly at the museum. Why do you think this has happened without anyone saying anything about it?
- Why do you think John wants to return home when he has an amazing job with the museum? What would you do?

## Chapter 14

- What is a radioactive isotope and how does it help scientists?
- Why is it a battle to protect natural areas? Why don't governments see the value in fossils or natural habitat, even when many scientists and local community members oppose developments?
- How does fossil hunting ignite your imagination?

# EXTENSION QUESTIONS FOR FURTHER THINKING

**What if** the Megalodon existed today? How might the oceans be different?

**Explore** some of the questions John wonders about in Chapter 5: How had dinosaurs grown so big with such small brains? How could one species have evolved from another? What caused an entire species to become extinct? Did a meteor wipe out the Cretaceous marine animals, like plesiosaurs and ammonites, along with the dinosaurs? Or was it something else?

**Paradox:** Fossil study has also opened up the world to mining for gas and oil. Does that mean that fossil hunting is a bad thing for humanity?

**List** the tools you need to become a scientist in palaeontology today, and also 100 years ago. Which set of tools do you think are more helpful to science? What unanswered questions might you have now, and which ones might you have had back then?

**Analogy:** How is fossil hunting like reading a book series?

**Imagine** you are the first to discover a new type of species. Create an interview with a journalist imagining what you would tell them (and perhaps what you wouldn't want them to know!)

## Appendix

Five Senses Chart (see PDF - just use second page of PDF)

# ELABORATION OF OUTCOMES TO THE AUSTRALIAN CURRICULUM

## Literacy

### STAGE 2

Discuss texts in which characters, events and settings are portrayed in different ways, and speculate on the authors' reasons (ACELT1594)

Draw connections between personal experiences and the worlds of texts, and share responses with others (ACELT1596)

Discuss how language is used to describe the settings in texts, and explore how the settings shape the events and influence the mood of the narrative (ACELT1599)

Make connections between the ways different authors may represent similar storylines, ideas and relationships (ACELT1602)

Plan and deliver short presentations, providing some key details in logical sequence (ACELY1677)

Use comprehension strategies to build literal and inferred meaning and begin to evaluate texts by drawing on a growing knowledge of context, text structures and language features (ACELY1680)

Plan, rehearse and deliver presentations incorporating learned content and taking into account the particular purposes and audiences (ACELY1689)

Use comprehension strategies to build literal and inferred meaning to expand content knowledge, integrating and linking ideas and analysing and evaluating texts (ACELY1692)

### STAGE 3

Make connections between students' own experiences and those of characters and events represented in texts drawn from different historical, social and cultural contexts (ACELT1613)

Analyse and evaluate similarities and differences in texts on similar topics, themes or plots (ACELT1614)

Identify, describe, and discuss similarities and differences between texts, including those by the same author or illustrator, and evaluate characteristics that define an author's individual style (ACELT1616)



Clarify understanding of content as it unfolds in formal and informal situations, connecting ideas to students' own experiences and present and justify a point of view (ACELY1699)

Plan, rehearse and deliver presentations for defined audiences and purposes incorporating accurate and sequenced content and multimodal elements (ACELY1700)

Navigate and read texts for specific purposes applying appropriate text processing strategies, for example predicting and confirming, monitoring meaning, skimming and scanning (ACELY1702)

Plan, rehearse and deliver presentations, selecting and sequencing appropriate content and multimodal elements for defined audiences and purposes, making appropriate choices for modality and emphasis (ACELY1710)

Analyse how text structures and language features work together to meet the purpose of a text (ACELY1711)

Use comprehension strategies to interpret and analyse information and ideas, comparing content from a variety of textual sources including media and digital texts (ACELY1713)

#### **STAGE 4**

Identify and explore ideas and viewpoints about events, issues and characters represented in texts drawn from different historical, social and cultural contexts (ACELT1619)

Reflect on ideas and opinions about characters, settings and events in literary texts, identifying areas of agreement and difference with others and justifying a point of view (ACELT1620)

Compare the ways that language and images are used to create character, and to influence emotions and opinions in different types of texts (ACELT1621)

Recognise and analyse the ways that characterisation, events and settings are combined in narratives, and discuss the purposes and appeal of different approaches (ACELT1622)

Recognise, explain and analyse the ways literary texts draw on readers' knowledge of other texts and enable new understanding and appreciation of aesthetic qualities (ACELT1629)

## **Science**

#### **STAGE 2**

Living things can be grouped on the basis of observable features and can be distinguished from non-living things (ACSSU044)

Science involves making predictions and describing patterns and relationships (ACSHE050, ACSHE061)

With guidance, plan and conduct scientific investigations to find answers to questions, considering the safe use of appropriate materials and equipment (ACSIS054, ACSIS065)

Living things have life cycles (ACSSU072)

Living things depend on each other and the environment to survive (ACSSU073)

### **STAGE 3**

Living things have structural features and adaptations that help them to survive in their environment (ACSSU043)

Scientific knowledge is used to solve problems and inform personal and community decisions (ACSHE083, ACSHE100)

Identify, plan and apply the elements of scientific investigations to answer questions and solve problems using equipment and materials safely and identifying potential risks (ACSIS086, ACSIS103)

Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena and reflects historical and cultural contributions (ACSHE098)

### **STAGE 4**

Classification helps organise the diverse group of organisms (ACSSU111)

Scientific knowledge has changed peoples' understanding of the world and is refined as new evidence becomes available (ACSHE119, ACSHE134)

People use science understanding and skills in their occupations and these have influenced the development of practices in areas of human activity (ACSHE121, ACSHE136)

Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge (ACSIS124, ACSIS139)

Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed (ACSIS125, ACSIS140)

Science knowledge can develop through collaboration across the disciplines of science and the contributions of people from a range of cultures (ACSHE223, ACSHE226)

# HASS

## **STAGE 2**

The representation of Australia as states and territories and as Countries/Places of Aboriginal and Torres Strait Islander Peoples; and major places in Australia, both natural and human (ACHASSK066)

The importance of environments, including natural vegetation, to animals and people (ACHASSK088)

The custodial responsibility Aboriginal and Torres Strait Islander Peoples have for Country/Place, and how this influences views about sustainability (ACHASSK089)

The use and management of natural resources and waste, and the different views on how to do this sustainably (ACHASSK090)

## **STAGE 3**

The environmental and human influences on the location and characteristics of a place and the management of spaces within them (ACHASSK113)

The contribution of individuals and groups to the development of Australian society since Federation (ACHASSK137)