

The refresh of *The New Zealand Curriculum* is replacing the Learning Progression Frameworks and Literacy Learning Progressions by incorporating the learning for literacy and communication into the curriculum learning area progressions. To learn more about the refresh, visit [Refreshing The New Zealand Curriculum](#).

Overview

The Valley of the Whales, in North Otago, holds the secrets of the biggest animals that ever lived. It tells the story of the evolution of whales in the Southern Ocean. This valley north of Dunedin hides a layer of limestone, a kind of rock that formed over millions of years as shells, sand, fish bones, and coral slowly built up on the sea floor. Buried in the limestone are marine fossils such as penguins, turtles, sharks, dolphins, and whales. How do palaeontologists find and retrieve the bones from these long-vanished species? What does it tell them about the past, and why does this knowledge matter?

“Valley of the Whales” is scaffolded for extra support: it includes short paragraphs, less text on a page, fewer complex sentences, vocabulary support, and clear diagrams.

A PDF of the text is available at www.schooljournal.tki.org.nz

Themes

“Valley of the Whales” connects to the theme of “uncovering the past”. It is designed to build knowledge and introduce the important ideas and vocabulary connected with the theme of uncovering the past. Other texts in this Journal also focus on this theme. Page 6 of this TSM gives an overview of all the texts in this Journal, including a list of themes for each text. There is also a link to the audio for this text, which provides further support so ākonga can revisit the story as often as they need to.

The theme of uncovering the past encompasses both the act of gathering information and evidence to find out about people, events, and changes as well as recording, piecing together, and analysing information to make sense of it. Among the texts that focus on this theme, some focus on the recent past (going back one or two generations) and others on the very distant past. Together, the texts reveal that what is uncovered about the past and the meaning ascribed to this knowledge will vary across personal, cultural, and scientific contexts.

Other themes that can be explored in this text include:

- Science (The living world)
- Palaeontology
- Evolution

Texts related to the theme

“Foulden Marr: Fossils or Food” *Connected* L4 2020 | “The Past Beneath Our Feet” *School Journal* L3 May 2016 | “A New Zealand Crocodile?” *Connected* L3 2013 | “Mary Anning: Fossil Hunter, The Dinosaur Hunter” *School Journal* L3 Sept 2012 | “Dodinga 1858” *School Journal* L4 Nov 2020 | “Orca: The World’s Largest Dolphin” *School Journal* L2 Nov 2020 | “The Tsunami That Washed Time Away” *Connected* L3 2014

A useful explanation of scientific language and terms can be found at the [Assessment Resource Banks](#).

Strengthening reading behaviours (what to notice)

Text structure and features

- **Abstract ideas**
*Every whale that ever existed can be traced back to Pakicetus or a species very much like it. This four-legged animal walked on land around 50 million years ago in the part of the world we now call Pakistan. Over time, animals that **descended** from Pakicetus and its relatives began to spend more time in the water.* (page 16)
- **Implied information or ideas**
“It’s like dealing with a crime scene,” Ewan says. “Only this crime scene is from long ago ... It’s important that we take our time.” (page 14)

Requiring ākonga to:

- make connections to what they know about how species change and evolve over millions of years
- use information in the text and their mathematical knowledge about large numbers to understand the huge time frames involved
- use their prior knowledge about crime scenes from TV shows or movies and the information about gathering evidence they have read so far to infer why uncovering the whale bones is like a crime scene

- **Technical information**
Whales that lunge-feed open their mouths wide, then push their bodies through the water with great force. The movement drives a massive amount of water into the whale's mouth. After closing its mouth, the whale pushes the water out through its baleen, leaving the food behind. (page 18)
- **Complex sentences**
By this time, South America had separated from Antarctica. When the two land masses finally broke apart, an ocean current was able to flow around the bottom of the planet. (page 16)
- make links to prior knowledge about what whales eat and how they feed and follow the process of lunge feeding by using the key nouns, verbs, and adverbs that describe this behaviour
- locate the main clause by using their prior knowledge about how complex sentences contain a complete main idea with the supporting clause or phrase adding details or information.

Vocabulary

Possibly challenging words and phrases

extinct, palaeontologists, limestone, fossil, quarry, evolved, baleen whale, descended, flukes, Antarctica, Antarctic Circumpolar Current, nutrients, plankton, krill, bristles, baleen, sieve, lunge-feed, ecosystem

Place names

Duntroon, Maerewhenua River, Antarctica

Species names

Eomysticetes, Waipatia maerewhenua, Squalodontids, Kairuku, Pakicetus, Ambulocetus, Kutchicetus, Rodhocetus, Dorudon, Odontocetes, Mysticetes

Helpful prior knowledge (pre-reading and introducing the text)

- Some knowledge about fossils – what they are, how old they are, and where they are found
- Some knowledge that scientists called palaeontologists study fossils to learn about the past
- Some knowledge about whales and dolphins, with the understanding that these species are related
- Some awareness about the concept of evolution and the lengths of time involved

Possible reading and writing purposes

- Find out how scientists learn about species that lived millions of years ago
- Learn more about how whales have evolved
- Describe the kinds of skills scientists need as they explore fossils from long ago.

Possible curriculum contexts

This text has links to level 4 of the New Zealand Curriculum in science, social sciences: ANZ histories – place and environment, and mathematics: Geometry and Measurement.

Understanding progress

The following aspects of progress are taken from the [Learning Progression Frameworks](#) (LPFs) and relate to the specific learning tasks below. See the LPFs for more about how ākonga develop expertise and make progress in these aspects:

- Acquiring and using information and ideas in informational texts
- Making sense of text: using knowledge of text structure and features
- Reading to organise ideas and information for learning
- Using writing to think and organise for learning.

Supporting ākonga for successful reading

- Share-read with ākonga who may require extra support and provide the audio for them to revisit the article as often as they need to. Some ākonga may benefit from listening to the audio before reading and discussing the ideas with others.
- After introducing the text with ākonga, have them work together to develop questions based on the 5Ws, which they can refer to during and after the reading. Model how to look for information and reflect on whether a question was answered or not.
- Have ākonga highlight vocabulary, concepts, sentences that were challenging, or places where they were confused and discuss strategies for working them out, such as decoding, word knowledge, context clues, and using the glossary. If necessary, pull out words for further discussion and exploration.
- On page 15, we read about examples of baleen whales, but it isn't until page 17 that the writer explains what baleen is. Use this as an opportunity to discuss the need to make connections across the text and make inferences to work out what a baleen whale is. English language learners may need to know what baleen whales are prior to reading the section on page 15. This could be done as a pre-reading task (to find out about baleen whales and toothed whales) so that English language learners can bring this knowledge to the reading of the text.
- Support ākonga to connect the text about the Antarctic Circumpolar Current on pages 16 and 17 with the image on page 17. Help them to clarify that the image shows a globe that centres on Antarctica and to trace the way the currents circumnavigate the pole. Use this discussion as an opportunity to make sense of the term "Antarctic Circumpolar Current".
- Clarify that baleen whales skim-feed by taking in huge mouthfuls of water and krill and then using their baleen (or bristles) as a sieve to expel the water but keep the krill inside their mouths. Have ākonga reread the descriptions of skim feeding and lunge feeding (pages 17 and 18) and explain these to a partner. Encourage them to use their own bodies to demonstrate how they think the whales feed.
- Check ākonga understanding of each section by modelling how they could turn the subheadings into questions (for example, on page 14, "What do they do back in the lab?"). For each section, they can identify the main ideas in the topic sentences and then the supporting facts, examples, and other information.
- There are numerous collocations that may be challenging for English language learners, such as "holds the secrets", "truck and trailer", "building material", "deep gash", "entire skeleton", "in the field", "family tree", "saw-like", "string of islands", "land masses", "swarm of krill". These words need to be explicitly taught as chunks of language will help them to understand the text.
- Check with English language learners that they understand that the rhetorical questions are a prompt for them to think about the content and that the answer is usually in the text. For example, "How did these huge animals come to exist?" (page 11) "How are the whale species related?" (page 14)

Strengthening understanding through reading and writing

Select from the following suggestions and adapt them according to the strengths, needs, and experiences of your ākonga. Most of these activities lend themselves to ākonga working in pairs or small groups.

- **ASK** ākonga to work in pairs to summarise the main points of the text and build a group summary. Record their ideas on a shared document or whiteboard.
- **DISCUSS** the features of a scientific report and ask ākonga to identify these features in the text. (For example, they are usually precise, formal, logical, condensed, and objective and contain technical information.) Use the Assessment Resource Bank item on the [language of science](#) to create a graphic organiser ākonga can use to identify examples of scientific language in this text.
- **ASK** ākonga to use the map on page 12 to identify where the Valley of the Whales is located and then speculate why the "secrets" of whales are held so far inland. Use this discussion as the catalyst for creating a graphic organiser with rows for ākonga to record questions about the text before, during, and after reading and columns for recording their answers. After the reading, discuss what ākonga learned that was new or surprising and how ākonga might find answers to any remaining questions.
- **SUPPORT** ākonga to explore the timeline in the diagram on pages 16–17, which is crucial to understanding how whales evolved. Emphasise that each unit of time refers to millions of years, for example, "55" is "55 million years". Ask ākonga to use the timeline to work out the time period for the evolution of whales. *How many years did it take for Pakicetus to evolve and become Mysticetes? How exact do you think these time frames are?* Help ākonga to an understanding that these species appear to have evolved over 10 million years and that some would have evolved faster than others but scientists cannot give specific dates.


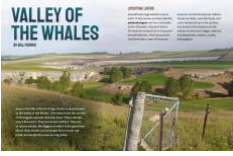
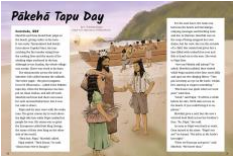





- **PROMPT** ākonga to connect the visual information in the diagram on pages 16–17 with the text so they can get a sense of the length of time involved in the evolution of whales. Working in pairs, ask ākonga to talk to each other about the changes they notice as whales evolve. Encourage them to pronounce the Latin names of the evolving whales as they do so. Model how to make descriptive statements they can share with the wider group. *Ambulocetus emerged about 47 million years ago. It had two small front flippers, two large back flippers, and a tail. It probably lived and hunted in the water and sometimes crawled onto the land to rest. Ākonga could conduct further research to check and add to their statements.*
- **DRAW ATTENTION** to the cause-and-effect relationships in the text. Discuss the fact that sometimes conjunctions like “because” signal this relationship, but at other times it is implied. Demonstrate this using the 25 Million Years Ago section on page 16 and then have ākonga identify and share other examples of cause-and-effect relationships in the text. Discuss how these examples combine to help us understand the evolution of whales and why we now find ancient whale bones in Otago.
- **DIRECT** ākonga to notice the way the writer adds detail to the descriptions and explanations through the use of verbs, adjectives, and adverbs and through main clauses with the addition of supporting clauses. Have them find and discuss examples. *What do these details add to the report? How interesting would the report be without these details? How do they add to our understandings?*
- **EXPLORE** the root words and derivations of the scientific terms, for example, the endings “ology” and “cetus” (which is short for “cetacean”). Discuss the use of Latin words to name living things and the way words are created to name creatures, which may refer to the place where they were discovered or the person who discovered them.
- **DISCUSS** the role of scientists in looking for evidence to explain and understand the world and the way that scientific knowledge changes over time as more evidence emerges. Ākonga could also watch a short clip to see how whales evolved from *Pakicetus*. Ask them to use the “Reflecting on the text” template on page 5 to capture what they have learned about the work of these scientists, what the scientists have discovered, and why their investigations are important.
- **SUPPORT CRITICAL THINKING** with a discussion about the ethics of fossil treasures being crushed when limestone is dug out to make fertiliser and building materials. Ākonga may connect this discussion to the similar issues around Foulden Marr. You could do an opinion continuum task where ākonga place themselves along a line in the classroom to symbolise where they stand on the issue – “I strongly agree/disagree with fossil treasures being crushed during limestone excavation.” Speaking frames for English language learners will help them to construct full and grammatically correct sentences about this. For example, “I believe that _____ because _____.”
- **ASK** ākonga to find out how different cultures or countries regard whales. For example, some Māori view them as taonga. In Niue, whales are regarded as a good omen. Ākonga could research narratives about whales from the perspective of their own culture, such as the Niuean legend about a woman named Mataginifale, who was swallowed by a whale and taken to Tonga.

Reflecting on the text: “Valley of the Whales”

Uncovering the past		
What questions do the palaeontologists want to answer?	Question 1	Question 2
What processes do the palaeontologists use to find answers to their questions? Describe how they do each of these.	i. Getting the bones out of the valley	
	ii. Getting the bones out of the rock	
	iii. Getting information from the bones	
What skills do palaeontologists need to carry out these processes successfully?		
What things have palaeontologists learnt from the bones about the evolution of whales?		
Why is it important that we learn these lessons about the past?		

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Exploring a theme: The texts marked with a **T** share the theme of uncovering the past.

		READING LEVEL	THEMES	CURRICULUM LINKS
	Keith STUDENT WRITING T A student describes the life of her determined and tenacious great-grandfather, who lost his arm in an accident and was an amateur photographer, a builder, a passionate whitebaiter, and a poet.	N/A	Family history Photography	English
	Valley of the Whales ARTICLE T DOWNLOAD AUDIO The Valley of the Whales in North Otago tells the story of the evolution of whales in the Southern Ocean. In the foothills of the valley, thousands of hectares of limestone contain an impressive number of marine fossils formed over millions of years.	Year 6	Palaeontology Evolution	Science: The living world Social sciences: ANZ histories – place and environment Mathematics: Geometry and Measurement
	Pākehā Tapu Day STORY T DOWNLOAD AUDIO This historical story is based on a true story. In 1828, English artist Augustus Earle was living in Kororāreka under the protection of the rangatira Uruti Te Whareumu, who was also known as King George. Te Whareumu had good relationships with European traders and missionaries and welcomed all Pākehā to live on his beach.	Year 8	History Relationships Te ao Māori/Tikanga	English Social sciences: ANZ histories – Place and environment, Culture and identity
	Beyond Imagination ESSAY T The author recounts her visits to Antarctica. “I learnt that far from being separate and never-changing, Antarctica connects us. It drives global weather patterns and ocean currents, and in a warming world, it’s changing faster than most places on Earth.”	Year 8	Climate change Scientists Geology Endangered species History	Science English
	Tokotoko POEM T This poem uses tokotoko to express ideas of whakapapa, tūpuna, family history, and belonging.	Year 8	Whakapapa Belonging Te ao Māori/Tikanga	Social sciences Health and PE English
	Paper Tiger STORY T When Claire visits her mother’s family in China, tensions rise between her mum and her grandmother and aunts when she finds a present the sisters received when they were children.	Year 7	Family/whānau Relationships Sibling rivalry	English
	The Stunt Man and the Geologist STORY Joseph goes along with his brother Toby’s stories and bullying of the other boys at the campground. “I knew he was exaggerating, but if I agreed, it made me the second coolest kid there.” When a new boy arrives with his family, Joseph has to decide whether to spend time with him or Toby’s gang. See the Mental Health Education guide for information about promoting a culture of inclusivity and encouraging ākonga to challenge bullying.	Year 7	Relationships Family/siblings Bullying	English Health and PE
	Silk Robes and Big Hats ARTICLE This article explores the work of multi-disciplinary artist Sam Duckor-Jones. “Sam’s work asks us to imagine a pinker, joyful, more inclusive world – one where we’re all free to put on silk robes and big hats and be absolutely, unapologetically ourselves.” For information about inclusion and diversity, see Relationships and Sexuality Education: A guide for Teachers, Leaders, and Boards of Trustees .	Year 7	Identity Gay pride Wellbeing Inclusion	Health and PE English The arts: visual arts