

HOW THE BORKS BECAME An Adventure in Evolution

by Jonathan Emmett & Elys Dolan
Published by Otter-Barry Books

Teaching Notes Key Stages 1 & 2 (Ages 5-11)

Author's Note

These teaching notes were written two years after *How the Borks Became* was first published and are drawn from my own experience of sharing the book in UK primary schools.

Although evolution is not a compulsory part of the UK primary curriculum until Year 6, research has shown that children are more likely to accept the rational, scientific explanation of life on Earth presented by evolution if they are introduced to it at the beginning of their primary education, rather than at the end, by which time less-rational explanations (both religious and non-religious) have often established themselves in children's minds.

How the Borks Became was created to introduce evolution – and Darwin's principle of **natural selection** in particular – to children in Key Stage 1 (ages 5-7), but has proved equally effective at Key Stage 2 (ages 7-11).

Jonathan Emmett, October 2020

Synopsis

The Borks are llama-like creatures who live on a faraway planet. While Borks were once smooth-furred, short-necked and blue, they are now shaggy-furred, long-necked and yellow. The book shows how three changes in their environment – extreme weather, the arrival of a predator, and a drought – results in the Borks evolving from one form to the other. At the end of the book, it's explained that life on Earth has evolved in a similar way, but far more gradually and over a much longer period.



Introducing Evolution

Ask: Do you think that all the plants and animals on planet Earth have always looked the way they do now?

Ask: How do we know that they have changed?

Ask: Have humans always looked the same?

Examine: Look at this timeline of human evolution from the book. (A copy of this timeline is included with these notes so that it can be shown on a large TV or projector screen.)



Explain: Humans are a type of animal. This picture shows how – over billions of years – other animals slowly changed, a bit at a time, to create modern humans like you and me. This change is called **evolution**.

Ask: Some of the animals in the timeline look like other animals living on planet Earth today. Can you see an animal on the timeline that looks like a:

jellyfish

gorilla

fish

rat

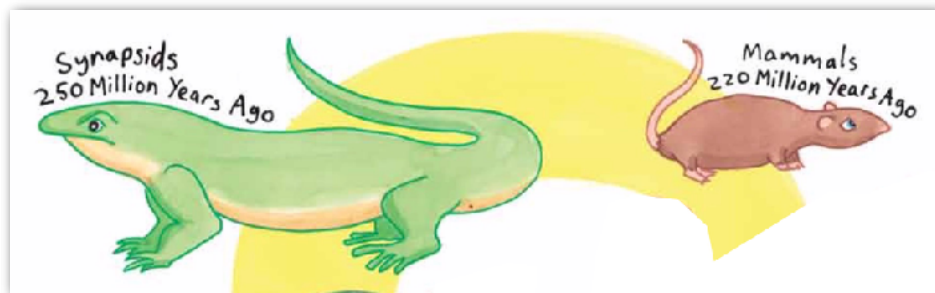
worm

monkey

lizard

Ask: Does this mean that humans are related to these other animals?

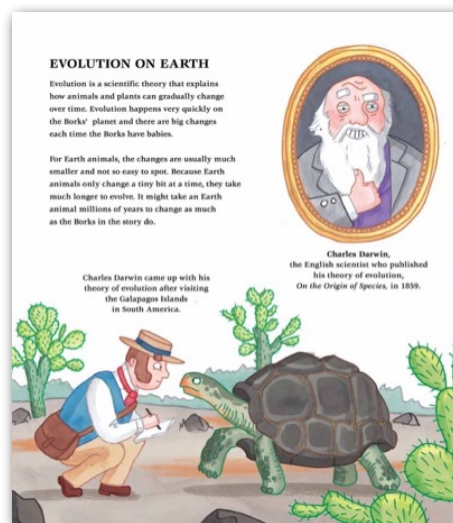
Examine: Look at these two animals that are next to each other on the timeline.



Ask: What changes can you spot between the first and second animal?

Explain: The idea that animals can change from one form to another has been around for over two thousand years (Anaximander c. 610 – c. 546 BC). But scientists did not understand HOW these changes were happening until about 150 years ago.

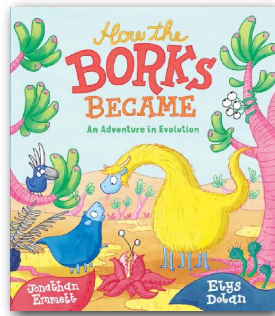
Examine: Look at the picture of Charles Darwin on this page of the book.



Explain: The mystery of how animals were evolving was solved by a scientist called Charles Darwin. The book *How the Borks Became* was created to show HOW animals evolve over time.

Introducing the Borks

Examine: Look at the picture of the Borks on the cover of the book.



Ask: Do you think the Borks are real creatures who live on planet Earth? If not, why not?

Explain: Scientists believe that if there is life on other planets, it would have evolved in a similar way to life on Earth. The Borks live on a faraway planet called Charleebob where evolution happens much quicker than on Earth, which makes it easier to see how it happens.

Examine: Look at this illustration which shows the Borks before and after they have evolved. (Use the text-free version of this illustration included with these notes so that students do not see the text that accompanies this illustration in the book. If possible, show the illustration on a large TV or projector screen to make it easier to see the detail.)



Ask: What changes can you spot between these two Borks?

Draw the table below on a whiteboard and write down the changes students spot in the first column, leaving a gap between each entry so that longer notes can be included in the second column.

Changes	Uses

There are at least eight differences between the two Borks. Try to identify at least five and make sure students identify the following three, which are featured in the book, prompting if needed.

Longer fur

Different fur colour

A longer neck

If necessary, prompt students to specify which particular parts of the Borks' body have changed. For example, if a student spots that the second Bork is taller, prompt them to identify which parts are taller (both the legs and the neck) and list these changes separately in the "Changes" column.

Explain: When animals (or plants) evolve, the changes that happen **help them stay alive until they are able to have babies of their own.**

Ask: Taking each change that the students have spotted in turn, ask students to suggest ways in which this change could help the second Bork to **stay alive**, when the first Bork could not. Explain that there may be more than one reason a change may help the second Bork to stay alive. For example: the second Bork's longer neck may help it to reach food AND peer over long grass or other vegetation to spot an approaching predator. Write down all of the valid reasons that students suggest for each change in the "Uses" column of the table next to that change.

Vocabulary development: Many students, from Key Stage 1 and above, may already be familiar with words that relate to evolution such as **camouflage**, **predator** and **prey**. If a student refers to 'the Bork's colour helping it to blend in with its background,' ask them if they know the word that describes this (or open it up to the rest of the class). Similarly if a student suggests that a particular change could prevent a Bork from being eaten by another animal, ask them if they know a word for an animal that hunts and eats other animals.

Make sure that students suggest the following reasons for the changes featured in the book, prompting if necessary:

Changes	Uses
Longer fur	Help the Bork to survive a spell of cold weather
Different fur colour	CAMOUFLAGE: Help the Bork to blend in with its surrounding and avoid being spotted by a predator.
A longer neck	Help the Bork to reach food that was high up.

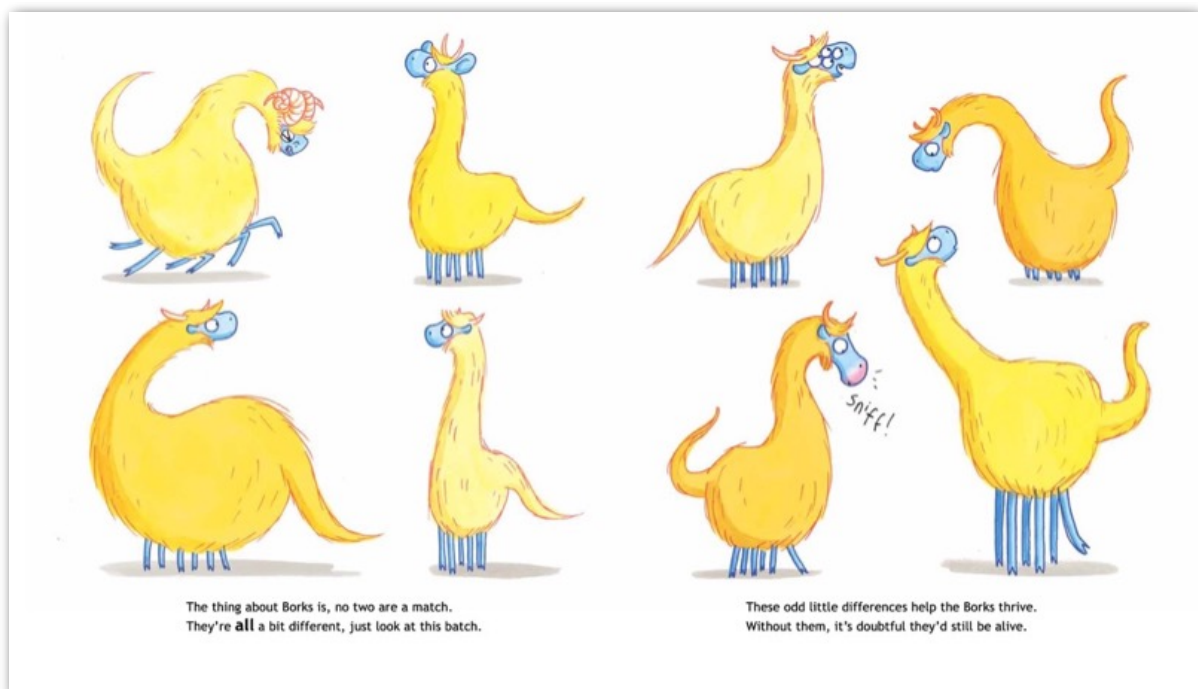
Tell the students that three of the changes they have spotted are explained by what happens in the book and that some students have suggested the reasons these changes take place. We will find out which students have guessed correctly by reading the book.

Reading the Book

Examine: Look at the explorer notes at the beginning of the book which show some of the other plants and animals that live on Planet Charleebob. Encourage students to try to spot these plants and animals in the rest of the book.

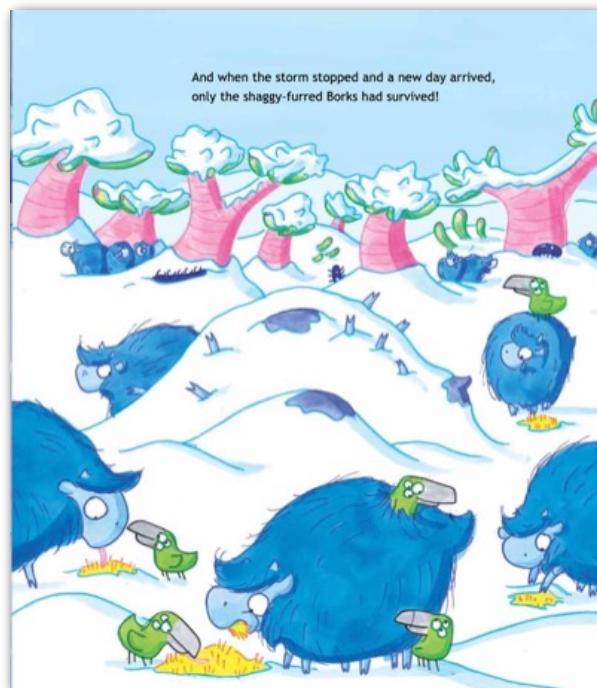


Examine: Look at this spread. (Differences between individual animals in the same species is essential to the process of evolution.)



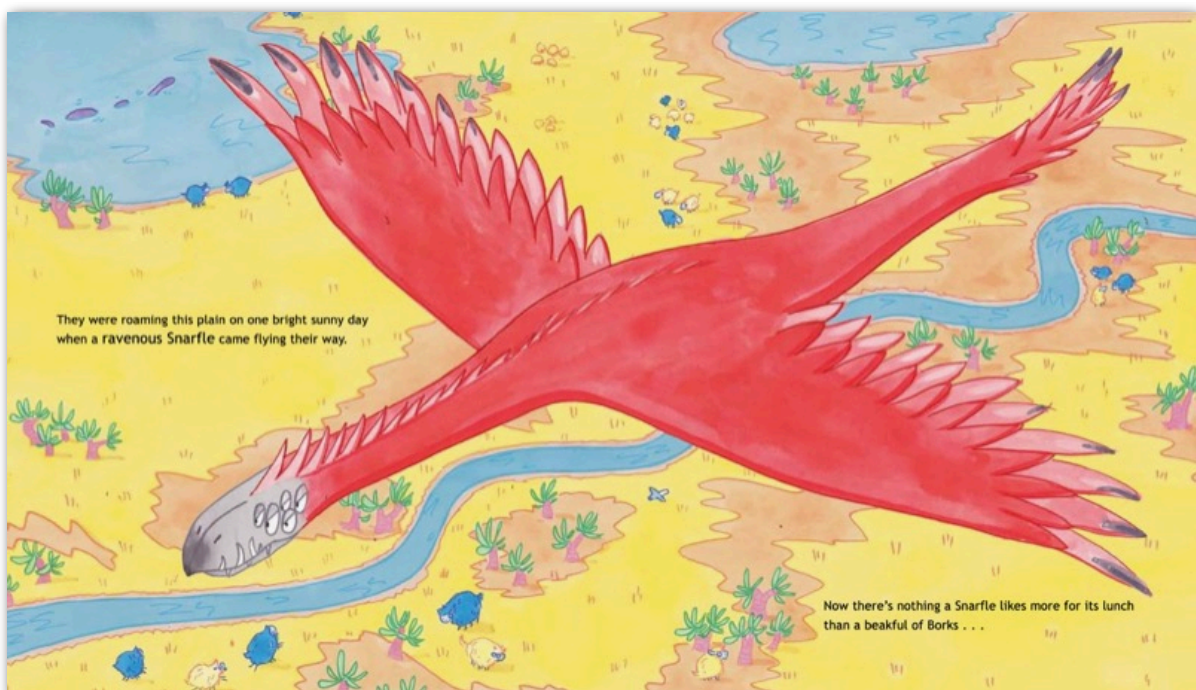
Ask (at the end of the page): Can you spot what makes each of these Borks different from the others?

Examine: Look at this page.



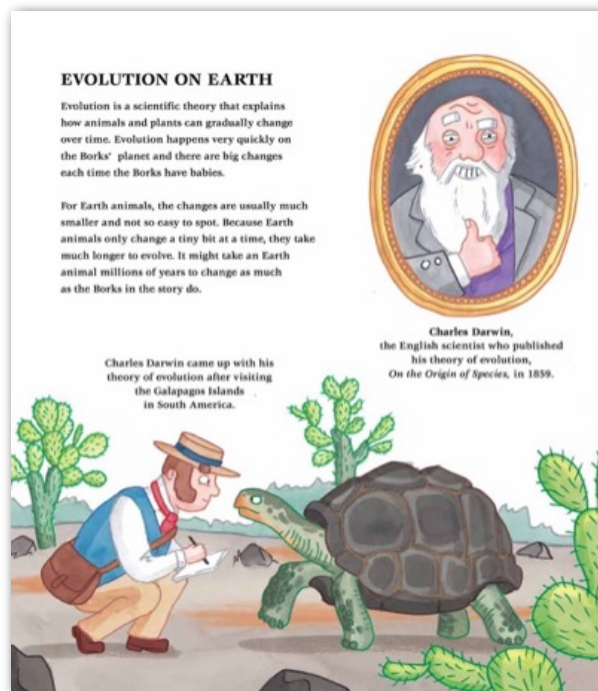
Ask (at the end of the page): Where are the shorter-furred Borks? Are they still alive?

Examine: Look at this page.



Ask (at the end of the first sentence): Do you think the arrival of the Ravenous Snarfle is good news for the Borks? Why do you think that? (What makes the Snarfle look like a predator?)

Examine: Look at this page.



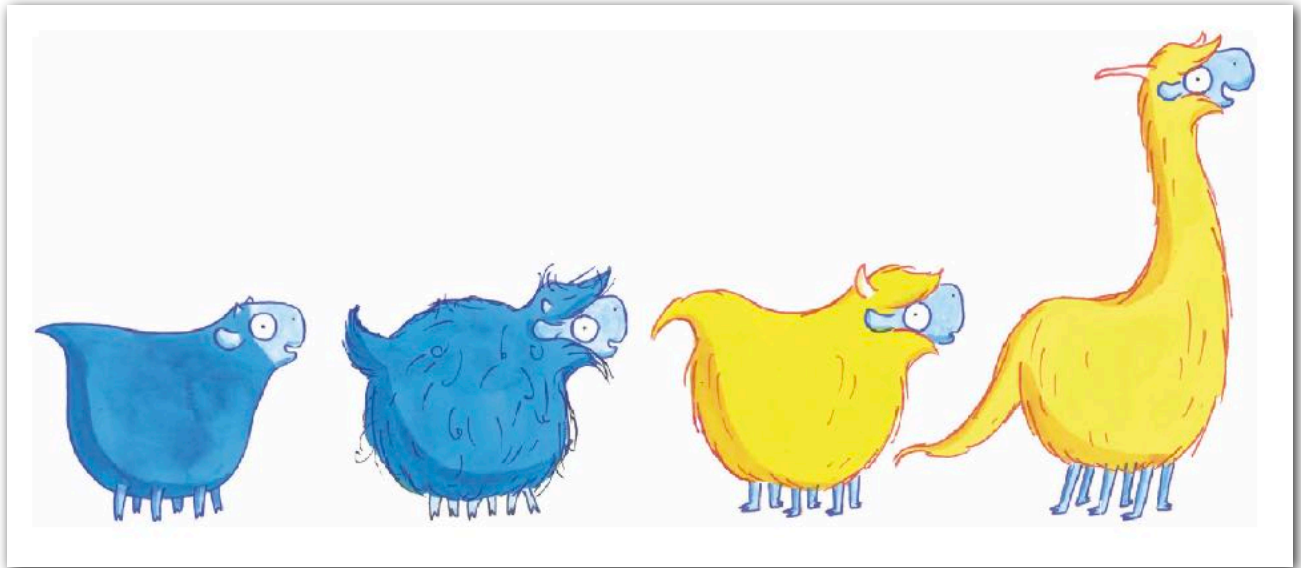
After reading the page, **emphasise that evolution on Earth usually takes place at a far slower rate and in far smaller steps than on Planet Charleebob.** Go back to the timeline on the previous spread and look at the last two stages.



Explain: There is very little difference between the *Homo heidelbergensis* and the modern humans they evolved into, but it took about a third of a million years for this change to take place. A *Homo heidelbergensis* person would have had a baby that was a tiny bit different

from them and that baby would have grown up and had a baby of their own that was a tiny bit different from them – and this was repeated about 15 thousand times before a modern human baby was born.

Examine: Look at this recap image (included with these notes).



Ask: Can you remember what happened in the book to make the Borks change from short-furred to long-furred?

Ask: Can you remember what happened to make the Borks' fur change colour from blue to yellow?

Ask: Can you remember what happened to make the Borks' necks become longer?

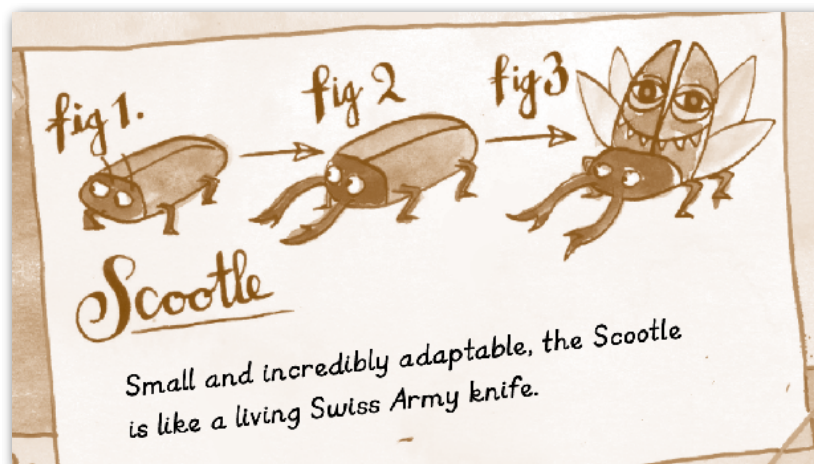
After Reading the Book

Examine: Look at the explorer notes at the beginning and end of the book.



Ask: Why do you think the author chose to call the planet the Borks live on **Charlesbob**? (If you look up Darwin's first and middle names on the internet, this will give you a clue).

Some of the explorer notes show how other animals evolve during the book. The Scootle evolves large pincers and an unusual pattern on its shell.

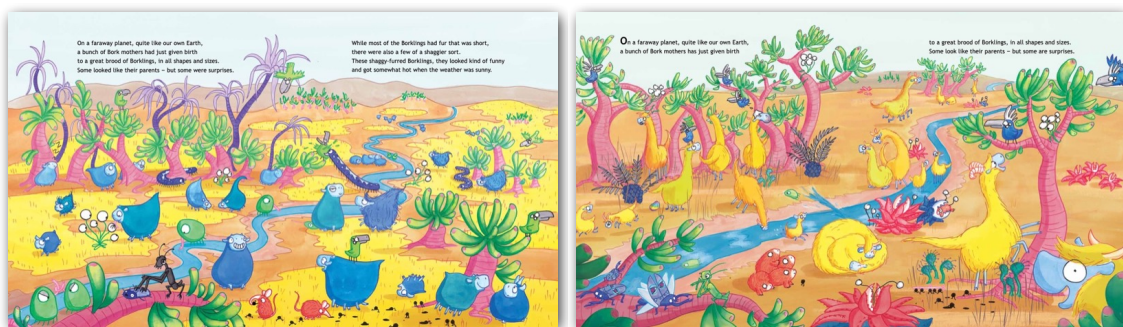


Ask: How might these changes help the Scootle to survive?

(Look at the illustrations in the book to find the answer. Find out about the Cuyaba Dwarf Frog which has evolved similar way: <https://www.nationalgeographic.com/news/2018/05/animals-frogs-poisonous-inflatable-backside-behavior-camouflage/>).

Explain: Not all plants and animals are able to survive by evolving. One plant and one animal shown in the explorer notes that are alive at the time of the smooth-furred Borks, have died out and become **extinct** by the time the Borks gain their long necks.

Compare these two spreads from the beginning and the end of the Borks' evolution.



Ask: Can you spot which plant and which animal have died out by the time the Borks have gained their long-necks?

Ask: Look at the illustrations in the book. Can you spot when they died out?

Ask: Why do you think they died?

Ask: Can you name any Earth animals that are now extinct?

On the other hand, some plants that are shown on the plain at the time of the long-necked Borks were not there at the time of the short-furred borks.

Ask: Can you spot which plants arrived after the time of short-furred borks?

Ask: How might these plants have arrived on the plain?

(You can watch a short video on seed dispersal here: <https://www.bbc.co.uk/bitesize/clips/znvfb9q>)

Ask: Do you think the Borks have finished evolving? What might happen to the Borks next to make them continue to evolve and in what way?

Activity Sheets

These two activity sheets are included at the end of these notes.



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Thanks to Dr Adam S. Smith for his help in preparing these notes.

Further reading

Here are three more books useful for introducing evolution to Key Stage 1 Primary and above.

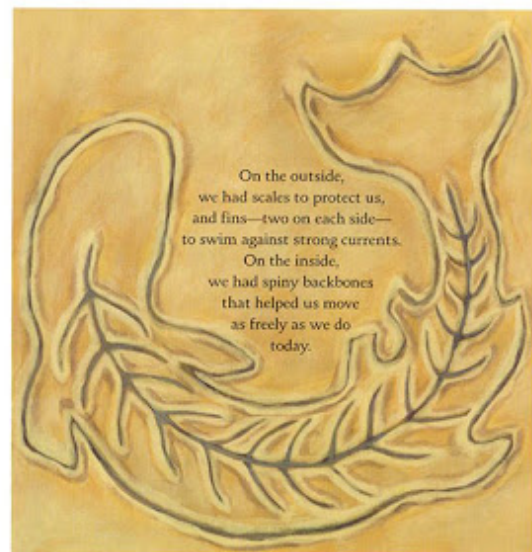
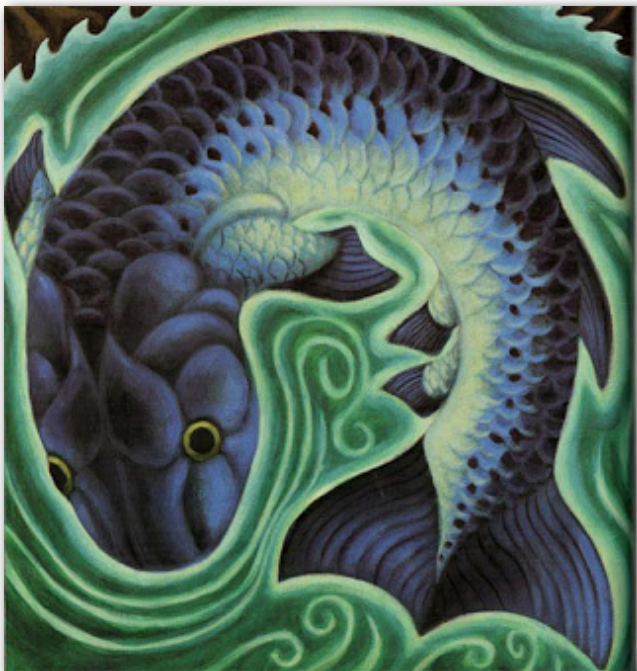


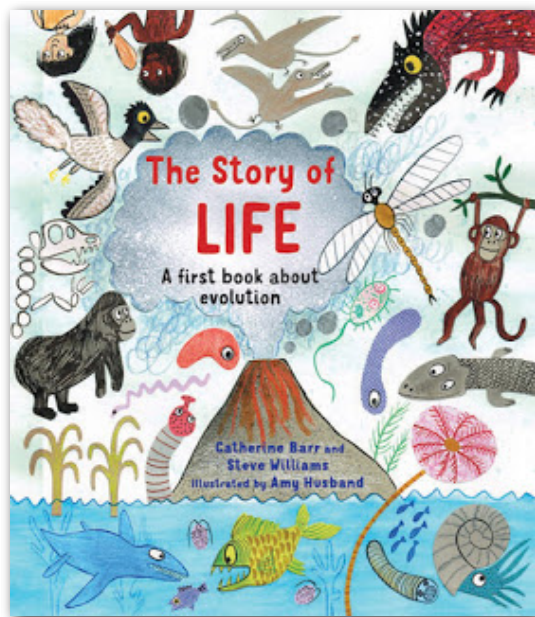
Our Family Tree: An Evolution Story

written by Lisa Westberg Peters
illustrated by Lauren Stringer

Suitable for age 5 and above.

This is a US picture book, but can easily be bought on import. Westberg Peter's simple, poetic text charts the evolution of humans from our beginnings as simple single-cell organisms to the present day, highlighting significant stages along the way. Stringer's illustrations intercut pictures of creatures in their natural habitats with images of a family mapping out an evolutionary diagram on a sandy beach. These sand drawings are cleverly employed to illustrate important developments in internal anatomy, such as the appearance of backbones and lungs. A glossary page and timeline at the back of the book give additional details and a sense of perspective to the book's four billion year narrative.



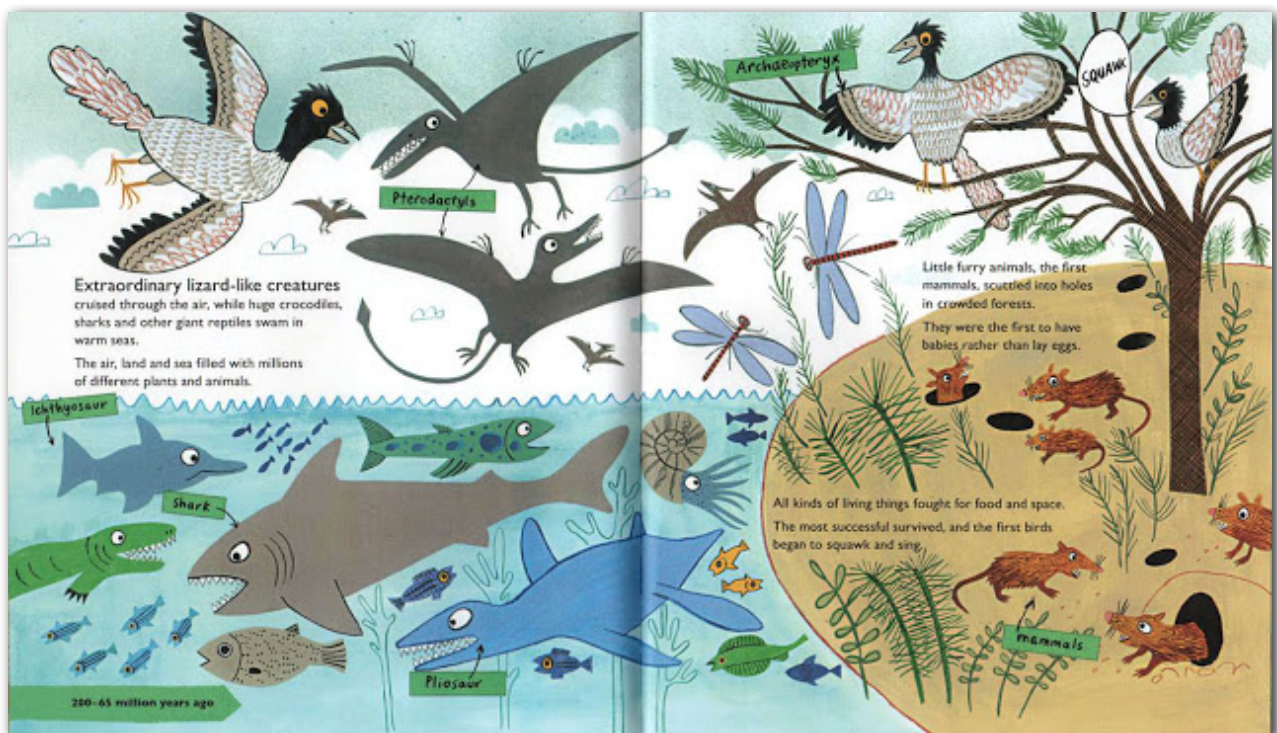


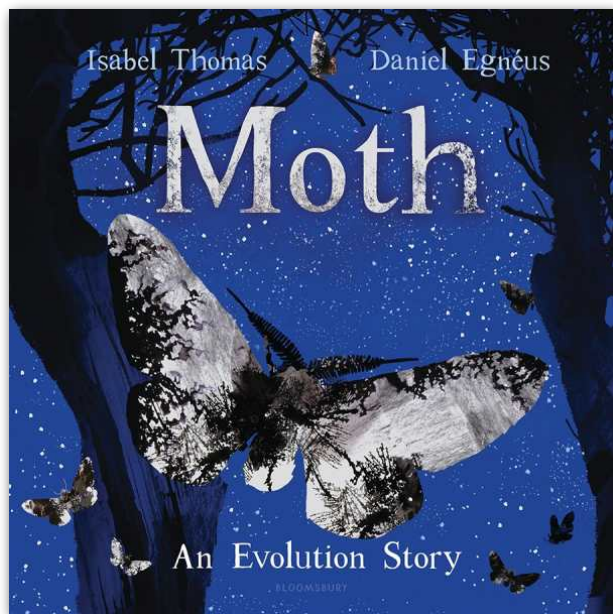
The Story of Life: A first book about evolution

written by Catherine Barr
and Steve Williams
illustrated by Amy Husband

Suitable for age 6 and above.

This book covers an even longer timeline than *Our Family Tree* and charts the evolution of all life on Earth with the time period displayed in the corner of each page. Amy Husband's lively illustrations display the diversity of Earth's plant and animal life at various stages in its early history, before narrowing the focus to show the last 12 million years of human evolution from the first apes to modern man on the last four spreads. The book finishes with an environmental message about the need to look after the planet that is our only home.





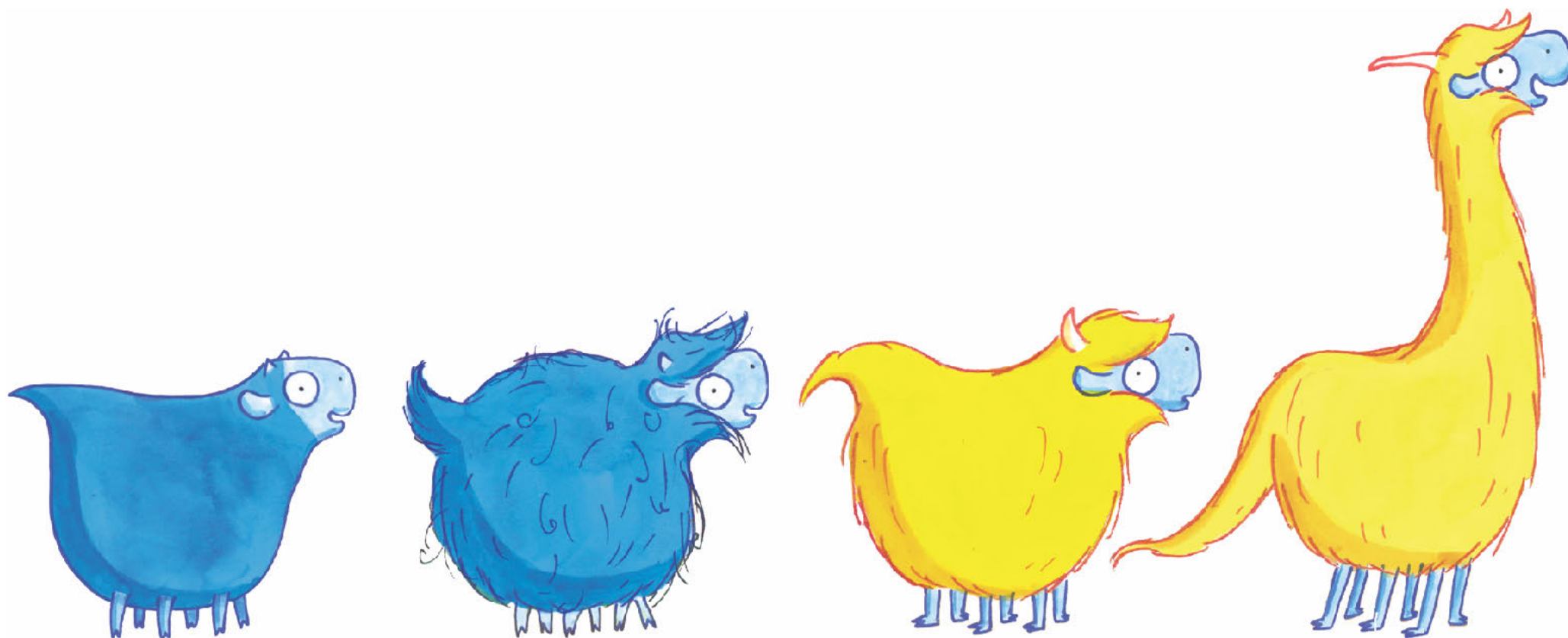
Moth:
An Evolution Story
 written by Isabel Thomas
 illustrated by Daniel Egnéus
 Suitable for age 5 and above.

This book shows how a single species, the peppered moth, has evolved in response to a changing environment. The moths' camouflage colouring goes from light to dark and back again as the trees on which they live become soot-blackened during late-19th-century industrial pollution, and then return to their natural colouring, as pollution is reduced, demonstrating that evolution is not a one-way process resulting in an ideal form.





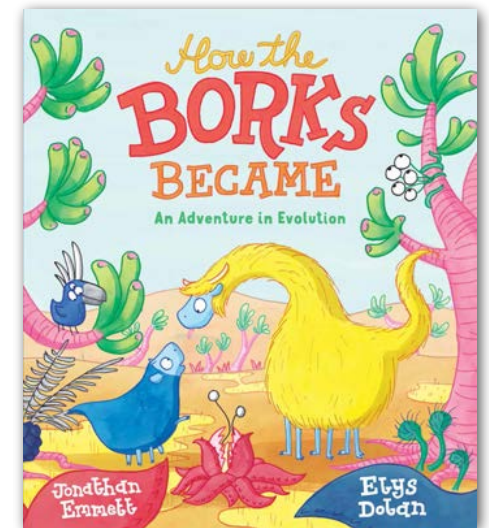






Evolution is dependent on differences between individual plants and animals.

Can you spot the TEN differences in these two pictures?



by Jonathan Emmett & Elys Dolan

Find out more about this book at

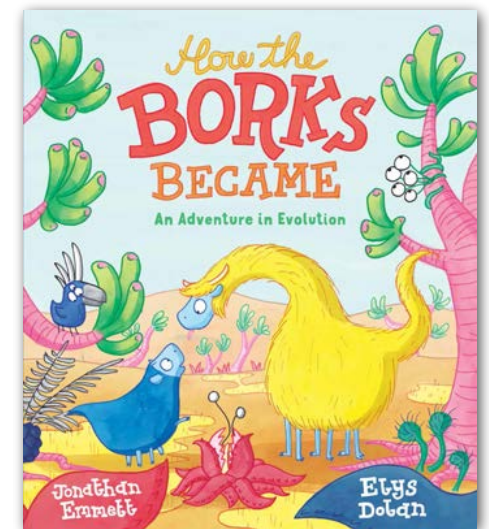
jonathanemmett.com



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Planet Charleebob is teeming with weird and wonderful plants and animals. Can you find all of their names – plus *Charleebob* and *Darwin* – hidden in this grid?



by Jonathan Emmett & Elys Dolan

Find out more about this book at

jonathanemmett.com



BEZZLER
BORK
CHAMP
DESMOND

FRICKLE
GAWP
JU-JU-BONG
MOSS

MUNTIS
QUINCH
SCOOTLE
SLUNKY

SNARFLE
YUM YUM
CHARLEEBOB
DARWIN



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