EVERYTHING YOU KNOW ABOUT DINOSAURS IS WRONG!

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and GAVIN SCOTT



nosy crow

FOR S. P. (FOR EVERYTHING)

N. C.

FOR EVERYONE AT
ST JOHN'S FIRST SCHOOL IN FROME

G. S.

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INTRODUCTION

The dinosaurs were animals that ruled the Earth for millions of years, during a time called the Mesozoic era, until they were all wiped out in a mass extinction 66 million years ago. Everyone knows that!

Now why on earth are you holding ANOTHER book about dinosaurs? Don't you know everything about *TYRANNOSAURUS*, *TRICERATOPS* and *DIPLODOCUS* already?

Well, this book is here to show you that, actually . . . everything you know about dinosaurs is *WRONG*!

Don't worry though – it's not your fault. It's because most of the facts you have learnt about dinosaurs have been told to you by grown-ups. But the thing about grown-ups is that they are all old . . . and the facts they know are old too!

And the funny thing about facts – especially old ones – is that, sometimes, they can be proved wrong when new discoveries are made.

In fact, the whole way science works is based on the idea that things can always be proved wrong if there's enough new evidence to show that they're not true. WHY is all this important?

Because over the last few years, scientists who study animals from the past, called palaeontologists, have discovered so many amazing, awesome, tiny, huge, weird, scary and cute new fossils of dinosaurs – now we KNOW that lots of things we THOUGHT we KNEW about dinosaurs are WRONG! So, fancy showing everyone how wrong they are? Get ready to UN-learn about dinosaurs!

ALL THE DINOSAURS LIVED AT THE SAME TIME

WRONG!

A lot of people think that all the dinosaurs lived at the same time: that dinosaurs like *STEGOSAURUS*, *TYRANNOSAURUS* and *PLATEOSAURUS* roamed the Earth together throughout the ages. In fact, different types of dinosaurs only lasted for two or three million years each, and only a few of the more famous dinosaurs ever lived together.

The dinosaurs lived during the *TRIASSIC*, *JURASSIC* and *CRETACEOUS* periods — huge blocks of time that stretched over the dizzyingly long '*MESOZOIC ERA*'. It's sometimes very hard to get your head around just how long this era — and the dinosaurs themselves — lasted.

In fact, dinosaurs like *TYRANNOSAURUS*, which appeared in the Cretaceous period, lived so long after the Jurassic dinosaurs like *STEGOSAURUS* that *TYRANNOSAURUS* lived closer in time to YOU than it did to them!

Dinosaurs from the beginning of the Mesozoic era and those at the end were separated by all this time, but palaeontologists, looking at lots of fossils together, love to track how dinosaurs evolved through time: how dinosaurs and their descendants changed shape. For example, *STEGOSAURUS* and its relative *ADRATIKLIT* looked quite similar, but parts of their skeleton as well as their spikes and plates, looked very different. They lived about 12 million years apart! To realise how long that is, 12 million years before today, giant ground sloths, three-toed horses and sabre-toothed tigers still walked the Earth!

Different dinosaurs lived at different times, and the length of time from the first to the last dinosaurs is almost impossible to understand. Palaeontologists only ever find fossils from tiny portions of time. Understanding the Mesozoic era is like trying to understand a whole story from just a few torn out pages of a book. The more fossils palaeontologists find, the more pages of the story they discover!

PALAEOZOIC ERA
The geological era before the Mesozoic, lasting from 541 to 252 million years ago.

MASS EXTINCTION

MESOZOIC ERA
The time between about 252 to 66 million years ago, also known as 'The Age of Dinosaurs'.

MASS EXTINCTION

CENOZOIC ERA
The current and most recent geological era, spanning 66 million years ago to the present day.



TRIASSIC PERIOD
252–200 MILLION YEARS AGO

One of the very earliest dinosaurs we know about was *NYASASAURUS* from 243 million years ago. It was small and speedy, but we only know about it from a few bones. In fact, some palaeontologists aren't even sure if it was a true dinosaur, as it lived over 10 million years before other animals we know definitely were dinosaurs, like *EODROMAEUS* and *GNATHOVORAX*. The earliest dinosaurs we're sure were actually dinosaurs lived in the Late Triassic and it was during this time that we can find the ancestors of other, more famous dinosaurs.

JURASSIC PERIOD
200–145 MILLION YEARS AGO

During the Jurassic, the Earth was a wetter world than during the Triassic, and it was the period when the dinosaurs became very successful. It lasted a very long time – the distance in time between *DILOPHOSAURUS* and *BRACHIOSAURUS* was 40 million years!

CRETACEOUS PERIOD
145–66 MILLION YEARS AGO

The Cretaceous was the time when the Earth began to look more like one we would recognise. More flowers evolved and the continents looked similar to how we see them today. By the start of this period, the dinosaurs had been on Earth for 100 million years – over 100 times longer than modern humans have existed for!

66 MILLION YEARS TO PRESENT DAY

WRONG!

ALL DINOSAURS BECAME FOSSILS

Everything we know about dinosaurs comes from fossils, so we depend a lot on finding them. But there's a problem . . . a bone becoming a fossil hardly EVER happens. It is an incredibly rare event and the chances of one single bone being fossilised is about one in a billion!

It's almost impossible for a bone to be fossilised if an animal lived in a dry place like up a mountain, or in a damp, moist place like a rainforest, where animals rot very quickly.

But at any one time during the Mesozoic era, perhaps millions of dinosaurs might have been alive all over the world.

And dinosaurs existed for millions of years! We've only been hunting for their fossils for just over 150 years so there must be hundreds of thousands of fossils still in the earth just waiting to be discovered!



AND every year the wind strips away more soil from the surface of the Earth, and the sea bashes away more rocks from the world's cliffs, which means we've still only seen the very top layer of fossils held within the ground.

Most fossils are found in very fine stones which were once layers of squishy, soft mud.

The best fossil sites in the world were once floodplains – areas of soggy land next to lakes or rivers. Like Auca Mahuevo in Argentina (where *SALTASAURUS* was discovered), or the Dinosaur National Monument in North America (where *STEGOSAURUS* was excavated).

A lot of these places are now very dry. The rock gets worn away quite quickly by the wind, exposing the glorious fossils they have been hidden for millions of years.

Because dinosaurs were more likely to be fossilised near to rivers, those that liked to drink and relax around these areas – and the clumsy ones who would fall into the water – are the ones we know about today.

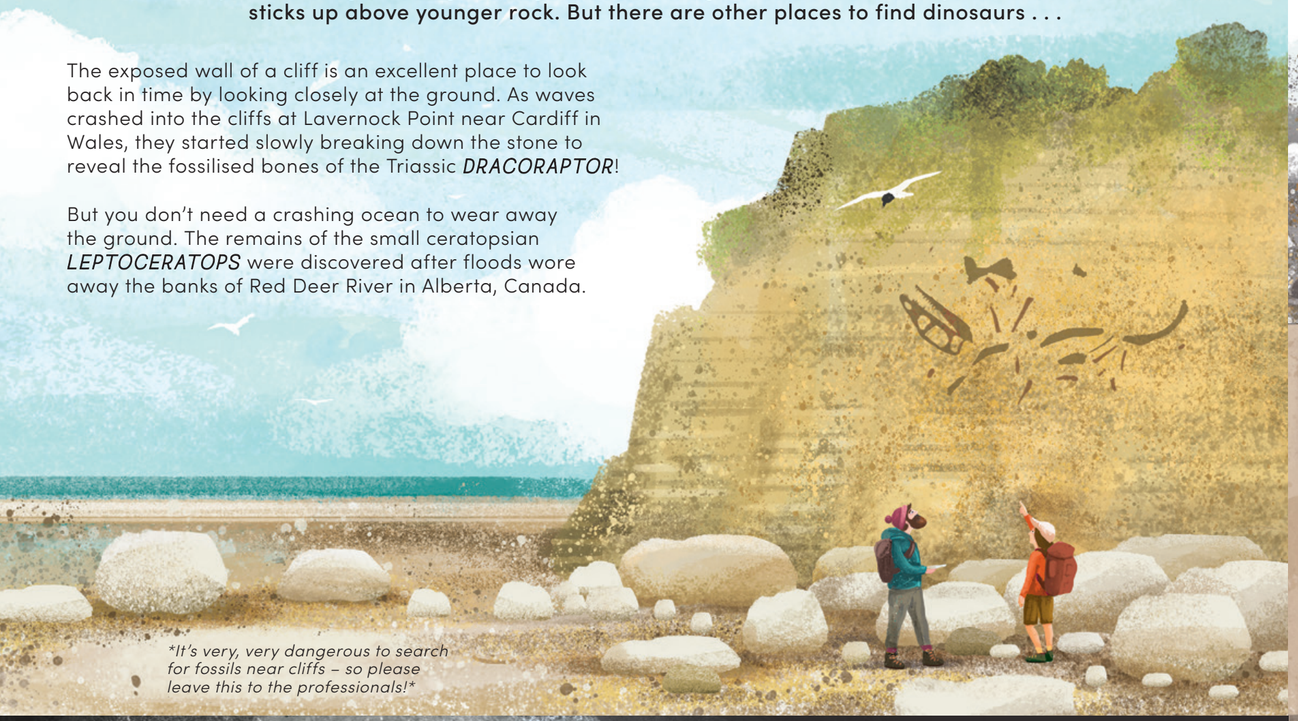
All this means that pretty much every dinosaur that EVER lived disappeared without a trace! Who knows what fascinating dinosaurs might have lived in dry woodlands, arid deserts, and rocky mountains?

DINOSAURS ARE ONLY DUG UP IN DESERTS WRONG!

It's true that dinosaurs are often found on the surface of the Earth where plants don't cover the ground and soil has been removed – in places just like rocky deserts. Here, palaeontologists can get straight down to the ground to examine very old rock that sticks up above younger rock. But there are other places to find dinosaurs . . .

The exposed wall of a cliff is an excellent place to look back in time by looking closely at the ground. As waves crashed into the cliffs at Lavernock Point near Cardiff in Wales, they started slowly breaking down the stone to reveal the fossilised bones of the Triassic ***DRACORAPTOR***!

But you don't need a crashing ocean to wear away the ground. The remains of the small ceratopsian ***LEPTOCERATOPS*** were discovered after floods wore away the banks of Red Deer River in Alberta, Canada.



It's very, very dangerous to search for fossils near cliffs – so please leave this to the professionals!

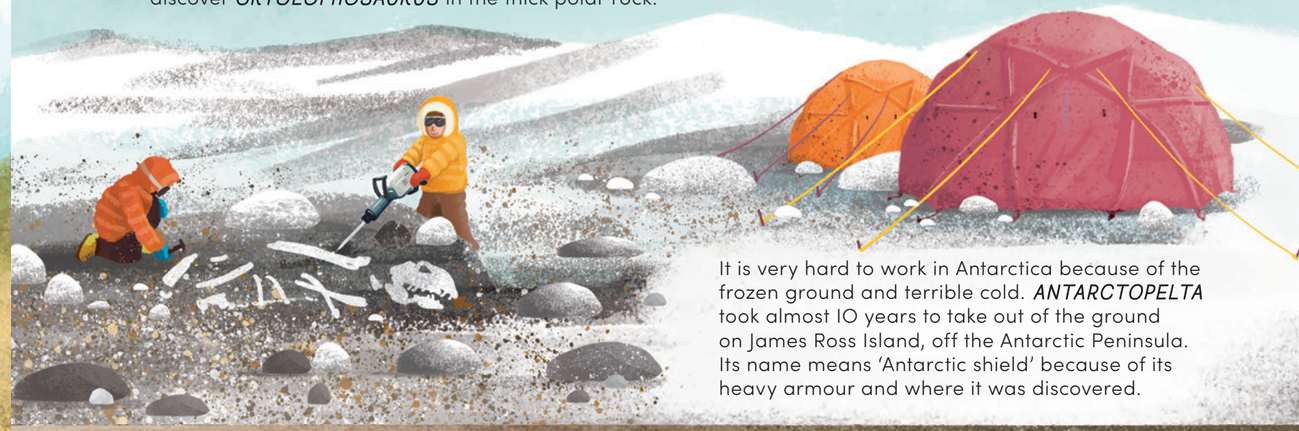


Digging into the ground is a sure-fire way to discover fossils. When miners were digging into the rocks of Canada looking for a type of oil, they discovered instead the fossilised remains of ***BOREALOPELTA*** complete with its skin, armour, snout and even fossilised lips!

Other mines are dug to search for different materials. ***FULGUROTHERIUM*** and ***MUTTABURRASAURUS*** from modern-day Australia were discovered by miners trying to find opal – a rare, blue stone some people like to wear as jewellery. Some of the dinosaurs' bones actually fossilised into this precious stone, which means they are very pretty . . . and worth a LOT of money.

Some places where palaeontologists find fossils are very hard to get to and haven't been visited by many people before.

On the slippy side of Mount Kirkpatrick near the Beardmore Glacier in Antarctica, palaeontologists needed to use a powerful jackhammer to discover ***CRYOLOPHOSAURUS*** in the thick polar rock.



It is very hard to work in Antarctica because of the frozen ground and terrible cold. ***ANTARCTOPELTA*** took almost 10 years to take out of the ground on James Ross Island, off the Antarctic Peninsula. Its name means 'Antarctic shield' because of its heavy armour and where it was discovered.

Traces of dinosaurs have been found on the Isle of Skye in the Inner Hebrides, off the coast of Scotland. A large collection of footprints were discovered on the tilted, rocky shore and palaeontologists clamber over miles of slippery, seaweed-covered rocks to study them. The coastline can be very blustery and cold in the winter, and swarming with midges in the summer!



Some places are much easier to find fossils in though. In Liaoning Province, Northeast China, a lot of beautiful fossils are found on hillsides by farmers, who discover delicate dinosaurs on thin slabs of rock on their land.



Opal mines, polar islands and slippery cliffs . . . so it's not just deserts after all!

DINOSAURS ARE EXTINCT

WRONG!

So, the world suffered a catastrophe 66 million years ago when a HUGE space rock slammed into the Earth where Mexico is today, spewing millions of tonnes of rock and ash into the air, blocking out the sun.

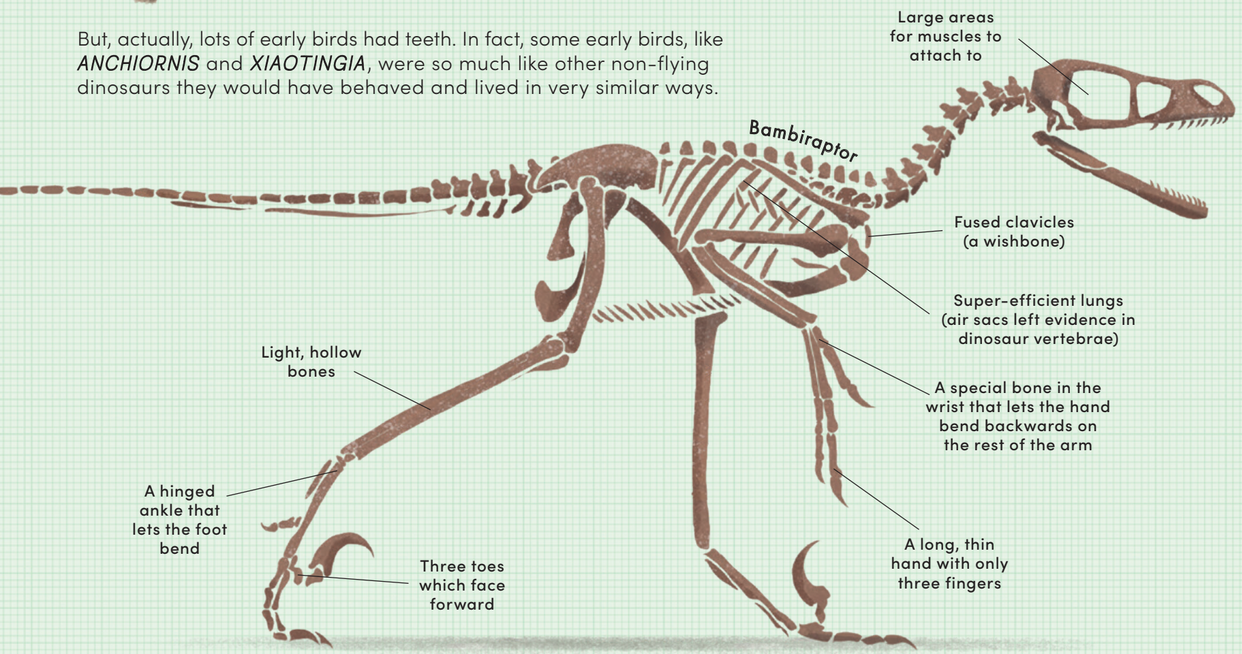
The world became a horrible place to live, and this 'mass extinction event' was the end of the road for most of the dinosaurs . . . but not ALL of them became extinct.



Yes . . . there are still dinosaurs alive today! And there might be one just outside your window. To help see how similar modern-day dinosaurs are to their ancient relatives let's think about a friendly neighbourhood pigeon. Because pigeons, like all birds, ARE dinosaurs.

Two-legged predators such as *BAMBIRAPTOR* already looked similar to modern birds under their skin, with fewer bones in their hands and a wishbone between their arms. But these dinosaurs had one thing modern birds don't have – teeth!

But, actually, lots of early birds had teeth. In fact, some early birds, like *ANCHIORNIS* and *XIAOTINGIA*, were so much like other non-flying dinosaurs they would have behaved and lived in very similar ways.



The Earth was a very tricky place to live after that asteroid slammed into it. Because birds' ancestors were much smaller than many other dinosaurs, they may have more easily been able to escape dangerous forest fires that erupted. Their beaks would have helped them eat difficult foods and their small size meant they could have babies more quickly than the larger dinosaurs. All this meant it was easier for them to survive in comparison to their bigger relatives.

Lots of birds had already evolved by the end of the Mesozoic era, but most didn't survive after the Cretaceous period and we only know about them thanks to their fossils.

The seed-eating *JEHOLORNIS* looked very different from modern birds as they still had long, bony tails!

Jeholornis

CONFUCIUSORNIS was the size of a dove and males attracted females by showing off their fancy tail streamers. They had very light bones, similar to birds today.

Confuciusornis

ALCMONAVIS was an early bird that had a skeleton and arm muscles that might have let it flap powerfully, something that other flying dinosaurs, like *ARCHAEOPTERYX*, couldn't have done well.

Alcmonavis

Some birds that lived in the Mesozoic have no ancestors today, like the long-snouted *SHANWEINIAO*.

Shanweiniao

Sapeornis

The large *SAPEORNIS* had teeth in their upper jaws, but not in the bottom. We also know it swallowed stones to help grind up its food!

From these beginnings, all the species of birds we know today, from hummingbirds to swans, from eagles to sparrows, slowly evolved. And each is an echo from an ancient age – dinosaurs are all around us!