

Dec. 13, 2013, 5 p.m.

## A parent's guide to dinosaurs: how not to get caught out by your kids



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Dr Mike Taylor is a computer programmer in his day-job, and a Research Associate at the University of Bristol. He has the luxury of working almost exclusively on sauropods, the most impressive and inspiring of all dinosaurs.

DINOSAURS are a minefield for parents. You might be used to teaching your kids about all sorts of things, but if they're dinosaur fans then the odds are they're teaching you. Want to avoid the pained expressions and disgusted tones of a child disappointed by your ignorance? Here are some important mistakes to avoid making.

### No, Dad, humans never lived alongside dinosaurs

Whatever you might have seen in films like *One Million Years B.C.* (pictured above), and whatever you might have heard from creationists, dinosaurs were long gone before we turned up. With one exception (see below) all the groups of dinosaurs became extinct at the end of the Cretaceous Period, 66 million years ago. The earliest humans evolved only two million years ago.

### No, Mum, dinosaurs didn't all live at the same time

The first dinosaurs evolved about 230 million years ago, 165 million years before *Tyrannosaurus rex*, *Triceratops* and the other late survivors. Many of the best-known dinosaurs, including *Diplodocus* and *Stegosaurus*, lived in the Late Jurassic about 150 million years ago. So *T. rex* lived much closer to our own time than to the time of *Stegosaurus*!

### No, Dad, dinosaurs didn't live in swamps

It's only a couple of decades ago that kids' books would show lots of dinosaurs living in swamps: all the sauropods - long-necked dinosaurs like *Diplodocus* - were routinely depicted up to their shoulders in water, and the duck-billed dinosaurs were often shown swimming or even snorkelling through hollow head-crests.

Oh dear, oh dear. Some old misconceptions about dinosaurs were based on what seemed like reasonable evidence at the time, but this one never made any sense.

Sauropods couldn't have walked in marshy areas because their feet were surprisingly compact - they would have got mired. They couldn't have spent their time under water, because they were much too light and would have floated to the top.

Duck-billed dinosaurs had supremely efficient grinding teeth that were suited to tough land plants. And their head-crests had no openings at the top, so it would have been impossible to breathe through them. Like all

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known dinosaurs, sauropods and duck-bills lived on land (though, like elephants, they probably went into water every now and then.)

#### Yes, Mum, birds are dinosaurs

There's one exception to the statement that all dinosaurs went extinct 66 million years ago: birds! That single group of dinosaurs made it past the great extinction – and they have diversified so successfully that there are twice as many living bird species as there are mammal species! The dinosaur origin of birds used to be one of several competing theories, but it now has been accepted by essentially all palaeontologists for more than a decade.

All right then: birds evolved *from* dinosaurs: but can we say that birds *are* dinosaurs? Or have they changed enough from their ancestors that they belong outside the group? Well, we still call bats 'mammals'!

Lots of non-bird dinosaurs in the Cretaceous were very bird-like. Really, the *only* thing that separates birds from other dinosaurs is their survival to the present – and that is not reason enough to say they don't belong to that great group.

#### No, Dad, pterosaurs aren't dinosaurs

If birds are dinosaurs, what about the other great group of flying vertebrates, the pterosaurs? They were more reptilian, like dinosaurs, right? So surely they were dinosaurs? Wrong again, Dad! The pterosaurs were not dinosaurs (though they were probably closely related) and they were not at all like any modern group of reptiles. They were relatively big-brained, warm-blooded, covered in fine hair, and able to control their wing membranes with extraordinary precision. (See also: marine reptiles. Nope - Plesiosaurs and ichthyosaurs aren't dinosaurs either!)

#### Yes, Mum, lots of dinosaurs had feathers

Pterosaurs weren't the only Mesozoic animals covered with hairs. Lots of dinosaurs were, too, and in some groups those hairy 'protofeathers' evolved into true feathers very much like those of modern birds. We know that dino-fuzz existed in dinosaurs as primitive as megalosaurs, which means we can confidently say that allosaurs, tyrannosaurs and many other groups had it. (Maybe even sauropods!) Proper veined feathers appear in dinosaurs like *Velociraptor*, quite wrongly depicted as scaly in *Jurassic Park*.

Does this mean that raptors were just big chickens? For one thing, no-one who's been attacked by an angry chicken will take them lightly: they have sharp claws and can move quickly when they want to!

Other modern birds are more dangerous: ostriches can kill lions with a single kick, and cassowaries have foot-claws that have been known to kill humans. Step back to the Cretaceous, and their relatives of the time would have had all that weaponry plus hand claws and sharp teeth. Ouch!

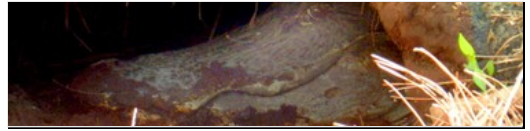
#### Yes, Dad, dinosaurs were warm-blooded

To make use of all that weaponry, the dinosaurs shared one more important feature with modern birds: a fast metabolism! Unlike lizards and modern crocs, they maintained high body temperatures. So they weren't just capable of quick movement (as lizards are), but also had good stamina: they could keep moving fast for a long time, chasing down prey and still having the energy to tear it to pieces!



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