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Education and Outreach: Dinosaurs in the movies

by [Szymon Górnicki](#)^{*1}

Introduction:

Dinosaurs fit perfectly into the role of movie monsters: many were enormous, or had distinctive characteristics such as spikes, horns, claws and big teeth. The fact that they aren't found in the modern world (except for birds) excites the imagination, and films represent some of the few opportunities to see them as they may have looked when they were alive. It's not surprising that the history of movies featuring dinosaurs goes back more than 100 years.

The cinematographic rise of the dinosaurs:

The first moving picture featuring dinosaurs was *Prehistoric Peeps* (1905), an adaptation of a cartoon with the same name. The film launched the popular trend of showing primitive humans and non-avian dinosaurs living alongside one another, even though the fossil record clearly shows that they were separated by many tens of millions of years. Next came *The Prehistoric Man* (1908), which tells the story of cavemen and dinosaur drawings coming to life. 1912 saw the debut of Gertie (Fig. 1), a funny female *Brontosaurus* (or *Apatosaurus*, as the species had been renamed in 1903), as part of a stage play. At this time, [sauropods](#) such as *Brontosaurus* were often shown living in water to compensate for their large mass, but Gertie was portrayed as an active land animal that behaved like a circus elephant. She was very popular: a short-film version of the stage show, *Gertie the Dinosaur*, a black-and-white short cartoon with live-action parts, was released in 1914.

A 1913 film, *Brute Force* (also known as *Primitive Man*), told the history of an arms race between hostile cavemen groups, and used dinosaurs only as background, but it pioneered dinosaur special effects with a moving life-size model of a *Ceratosaurus*. It was also probably the first film to use modern reptiles disguised as prehistoric animals. The technique later became common: it turned up in many movies, such as *One Million B.C.* (1940), *Two Lost Worlds* (1950) and *The Lost World* (1960).

Rediscovered worlds:

The first full-length movie to feature dinosaurs is a cinema classic: *The Lost World* (1925). Based on the 1912 book by Sir Arthur Conan Doyle, it tells of dinosaurs that survived the mass extinction at the end of the Cretaceous period, and lived unnoticed into modern times in a far-flung corner of South America. Sculptor Marcel Delgado made dinosaur models for the film based on the work of a leading palaeoartist of the time, Charles Robert Knight. Stop-motion pioneer Willis O'Brien brought these extinct animals back to life using animation.

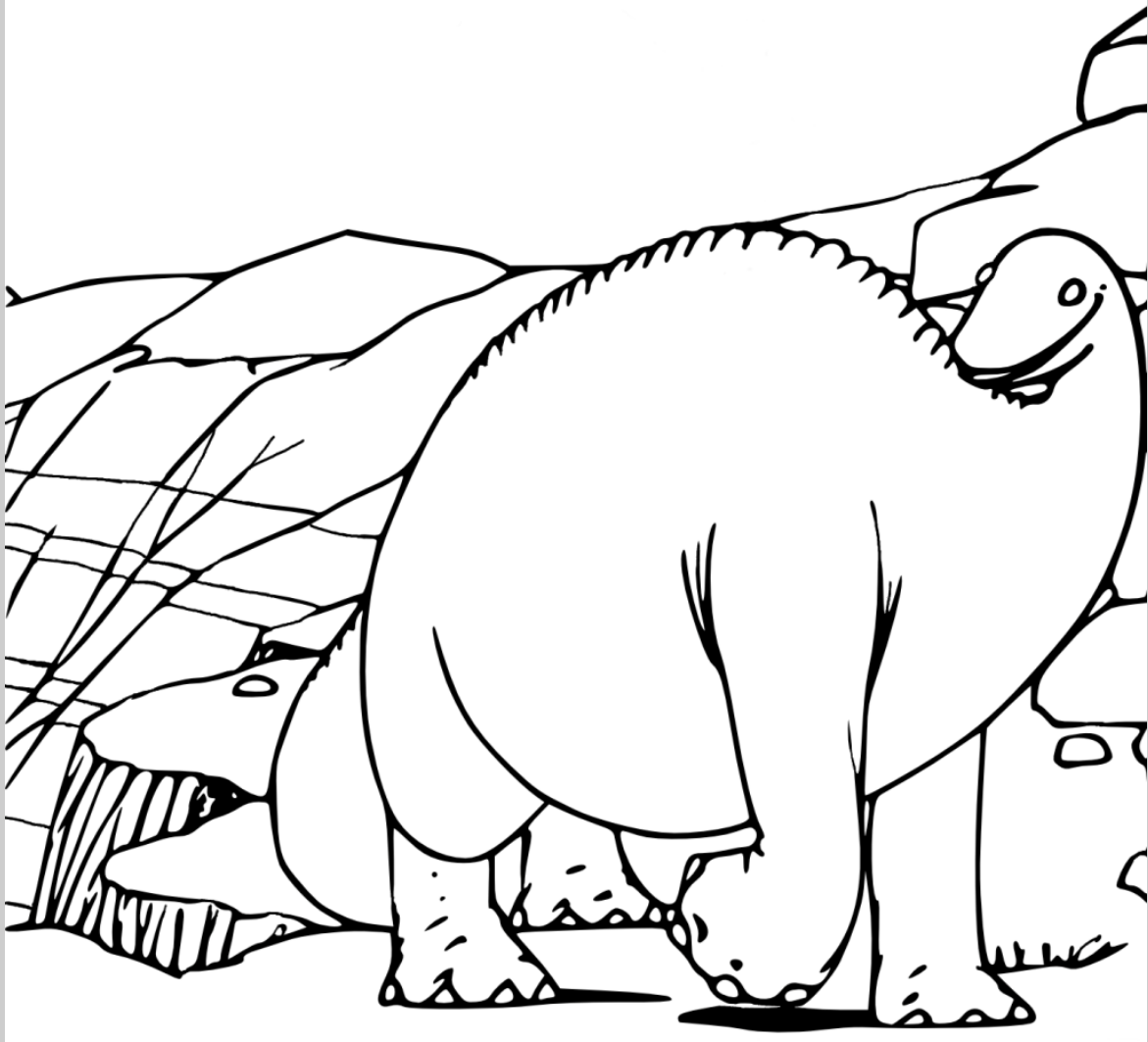


Figure 1 — Restoration of image from *Gertie the Dinosaur* (1914).

Based on our current understanding of dinosaur palaeobiology, it is clear that the film contained many scientific errors: all the dinosaurs dragged their tails along the ground (Fig. 2A,B); two-legged dinosaurs were depicted in a kangaroo-like pose, with the tail functioning as a third leg (Fig. 2A); and *Brontosaurus* was shown to have a flexible neck. However, the reconstructions of dinosaurs *were* accurate according to the science of the time. In fact, in terms of their behaviour, the dinosaurs from the first adaptation of *The Lost World* were ahead of their time. Dinosaurs had previously been considered slow, lumbering, cold-blooded animals. But in *The Lost World* (1925), they were presented as active and agile, and brontosaurus lived on land, as part of a herd. The film did also inspire a few modern *clichés*: for example, it shows a dinosaur terrorizing a present-day city.

Equally realistic dinosaurs appeared in *King Kong* (1933), again thanks to the duo of Delgado and O'Brien. The film does include some eye-catching errors, though, including a *Tyrannosaurus rex* with three fingers rather than two (a mistake that was intentionally repeated in the remake of *King Kong* in 2005) and a *Brontosaurus* — in life, a plant-eater — shown with deadly jaws.

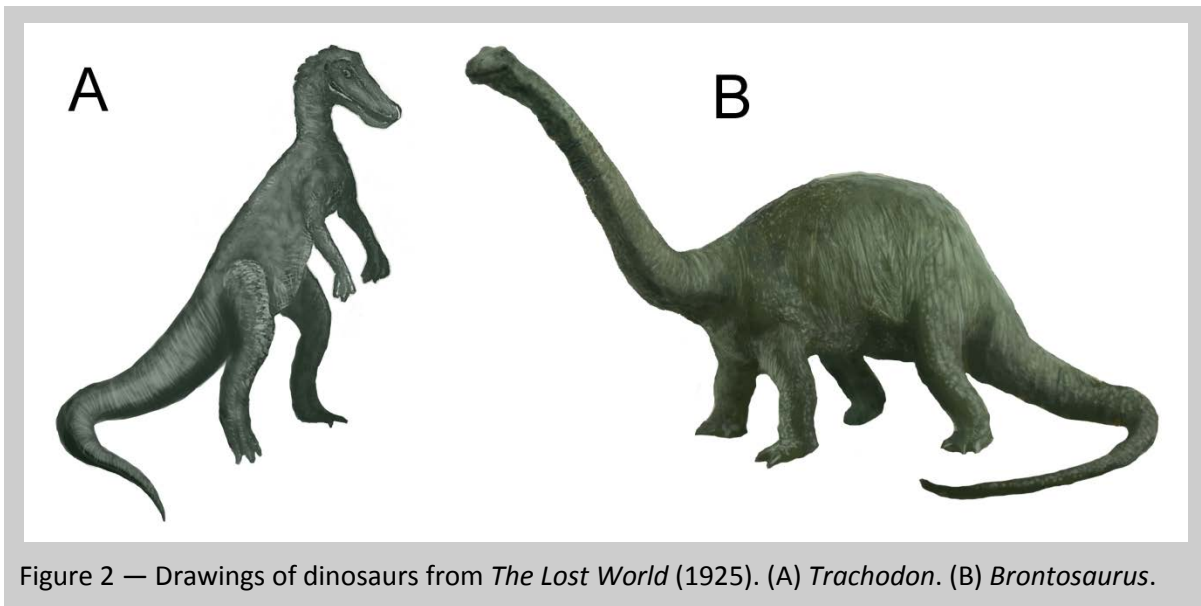


Figure 2 — Drawings of dinosaurs from *The Lost World* (1925). (A) *Trachodon*. (B) *Brontosaurus*.

The first colour film with dinosaurs was *Unknown Island* (1948), an alternative film with low-budget special effects. This particularly shows in the reconstructions of the dinosaurs, which were played by people in costumes. This type of costume acting was possible because [theropods](#) such as *T. rex* were thought at the time to have human-like body postures. (We now know that this isn't true, but *Jurassic Park* (1993) still used this technique in a few shots). Subsequent monster movies with theropod-like creatures include *The Beast from 20,000 Fathoms* (1953), *Godzilla* (1954) and *Gorgo* (1961). The storylines of all these films are much the same: a giant prehistoric creature (larger than most dinosaurs) awakes and begins to destroy a city, killings hundreds of people. The creature is endowed with incredible strength and resistance (including against weapons).

One Million Years B.C. (1966) was revolutionary in terms of its special effects. This was chiefly due to the extraordinary talent of the stop-motion master Ray Harryhausen. The film shows tribes of cavemen living alongside dinosaurs, gigantic spiders, lizards and other hominoids. It also mixes dinosaurs from different geological periods, with, for example, fights between the [Jurassic](#)-age *Ceratosaurus* and the [Cretaceous](#)-age *Triceratops* (Fig. 3).

In 1969, John Ostrom published a description of a rather unusual dinosaur (for that time) called *Deinonychus*. This led to the 'dinosaur renaissance', which ushered in a radical change in the perception of dinosaurs among palaeontologists, who started to think of them as active, intelligent animals. However, the dinosaur renaissance was not reflected in films for decades. In the same year that Ostrom described *Deinonychus*, the Harryhausen-animated *The Valley of Gwangi*, hit the big screen. It focuses on a large theropod named Gwangi, which survives until the Wild West era, when it is found separated from the rest of the world in an unknown valley. Gwangi closely resembles previous visualizations of *Tyrannosaurus*. Harryhausen called it an *Allosaurus* or *Tyrannosaurus*, noting size as the only difference between these two genera; however, palaeontologists now know that there are many more differences such as the morphology of the skull and forelimbs. Also featuring in the film are *Styracosaurus*, *Ornithomimus*, *Pteranodon* and *Eohippus*, but there is no logical explanation for how they managed to co-exist.



Figure 3 — Drawing of *Triceratops* from *One Million Years B.C.* (1966).

Dinosaurs also appear in a similar production called *Planet of Dinosaurs* (1977). This movie is distinguished from previous ones by the concept of people interfering in the world of dinosaurs. In an indeterminate future, the crew of a spaceship crash-lands on a planet very similar to Earth, but millions of years behind in its evolution of life. In fact, it is very unlikely that species identical to Earth's dinosaurs would evolve on another planet, even one very similar to Earth (lots of events leading to the era of the dinosaurs would have to occur in the same way as on Earth). More than a decade later, the animated adventure drama *The Land Before Time* (1988) also featured 'pre-renaissance' dinosaur restorations, including a young *Brontosaurus* named Littlefoot as the main character.

Digital dinosaurs:

Jurassic Park (1993) was groundbreaking, particularly in terms of its special effects, which included animatronic models and computer animation. It was also revolutionary in the way the dinosaurs were portrayed. The film presented 'renaissance' dinosaurs to a wide audience for the first time. The animals are fast, display complex behaviors and feature state-of-the-art anatomical reconstructions such as spines set in the correct position parallel to the ground, and they no longer drag their tails along the ground (Fig. 4A,B). The film also provides information about the close relationship of dinosaurs with the birds. On the other hand, dinosaurs in the park are often shown as more bloodthirsty and aggressive than was likely. What is more, because of its cultural impact, the film popularized many fundamental errors, including: [Tyrannosaurus](#) with a visual system based on movement (Fig. 4C); a large and intelligent [Velociraptor](#) with a *Deinonychus*-like appearance (Fig. 4B); a small [Dilophosaurus](#) with fictional neck frill and the ability to spit venom; and a sneezing [Brachiosaurus](#) that chewed its food and stood up on its hind legs. The park was created in a much shorter period of time than that necessary for the real dinosaurs to develop into adults. The movie also presented new concepts of bringing dinosaurs back to life through the help of genetic engineering (although the process outlined in the film is now widely recognized as scientifically impossible). *Jurassic Park* is an adaptation of Michael Crichton's novel of the same name, and many ideas, including some of those mentioned above, were copied from the book.



Figure 4 — Dinosaurs from Jurassic Park series. (A) *Tyrannosaurus* concept art (*Jurassic Park*, 1993). (B) *Velociraptor* clay maquette (*Jurassic Park*, 1993). (C) Scene with *Tyrannosaurus* animatronic puppet (*Jurassic Park*, 1993). (D) *Pachycephalosaurus*, *Triceratops* and *Stegosaurus* models (*The Lost World: Jurassic Park*, 1997). (E) *Velociraptor* animatronic puppet (*Jurassic Park III*, 2001). (F) *Spinosaurus* model (*Jurassic Park III*, 2001). Courtesy of Stan Winston School of Character Arts.

A year after the discovery of a feathered *Sinosauropteryx*, a sequel to *Jurassic Park* appeared: *The Lost World: Jurassic Park* (1997; based on Michael Crichton's novel *The Lost World*). Despite recent discoveries, this continued to show images of dinosaurs similar to those from the previous film. An educational plus of the film is that the *Tyrannosaurus* is portrayed taking care of its offspring. The

minuses include *Procompsognathus* attacking large animals (humans) and *Pachycephalosaurus* that are much too small (Fig. 4D).

Riding on the new wave of computer-generated dinosaurs came the Disney-produced *Dinosaur* (2000), a children's film with 'renaissance' dinosaurs. Disney's dinosaurs are largely anatomically correct. Despite this, the picture showed the co-existence of lemurs and dinosaurs, which originally came from very different periods of time and geographical locations. And the main antagonist, *Carnotaurus*, is shown as about the size of *T. rex*, but was in reality much smaller.

The signs and impact of the discovery of feathered dinosaurs can first be seen in *Jurassic Park III* (2001). The *Velociraptor* gets a new, more colorful design (Fig. 4E), with differences between the sexes and isolated proto-feathers. The film also presents the world's new largest carnivorous dinosaur, *Spinosaurus* (Fig. 4F). *Spinosaurus*, despite being initially described in 1915, had been largely forgotten because of the destruction of the only known, sparse remains during the Second World War. Discoveries made several years after the premiere of the film confirmed that *Spinosaurus* reached record sizes, but, in contrast to what *Jurassic Park III* shows, *Spinosaurus* may have had a semiaquatic lifestyle and mainly eaten fish. In the same year, another screen adaptation of *The Lost World* (2001) also appeared. Although the book by Arthur Conan Doyle has had a lot of film adaptations, this one is the most faithful to the book. Furthermore, it has the most correctly portrayed dinosaurs. The reconstructions were created by the same team that made the documentary *Walking with Dinosaurs* (1999).

Only a few films present feathered dinosaurs on the big screen, such as *Dinosaur Island* (2014). What's more, the latest continuation of the Jurassic Park franchise, *Jurassic World* (2015), is a step backwards in terms of scientific accuracy. Not only has the appearance of the dinosaurs not been upgraded in line with current scientific understanding, but some dinosaurs are not as accurately represented as in the previous films (these include *Velociraptor* and *Stegosaurus*).

Summary:

Filmmakers are sometimes guilty of misrepresenting or misusing scientific facts to produce the best story. Indeed, many modern movies are largely unconcerned about the scientifically accurate visualization of dinosaurs. Before the dinosaur 'renaissance', filmmakers' visions were often ahead of current scientific views, particularly in terms of reconstructions of dinosaur behaviour. However, the impact of the renaissance was not seen in cinemas until two decades after it emerged in the scientific world. In recent years, only a few films have presented feathered, bird-like dinosaurs. Most stay with their traditional depictions. Fortunately, there is an alternative opportunity to see these extinct animals in motion, in the form of television documentaries such as *Planet Dinosaur* (2011), *Walking with Dinosaurs* (1999) and *When Dinosaurs Roamed America* (2001).

Suggestions for viewing:

Dinosaurs Movies (1993) Director: Donald F. Glut.

Movie Magic : DINOMANIA (1996) Glacier Point Production & The Discovery Channel.

Gertie the Dinosaur (1914) Director: Winsor McCay.

The Lost World (1925) Director: Harry Hoyt.

King Kong (1933) Director: Merian C. Cooper & Ernest B. Schoedsack.

Jurassic Park (1993) Director: Steven Spielberg.

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