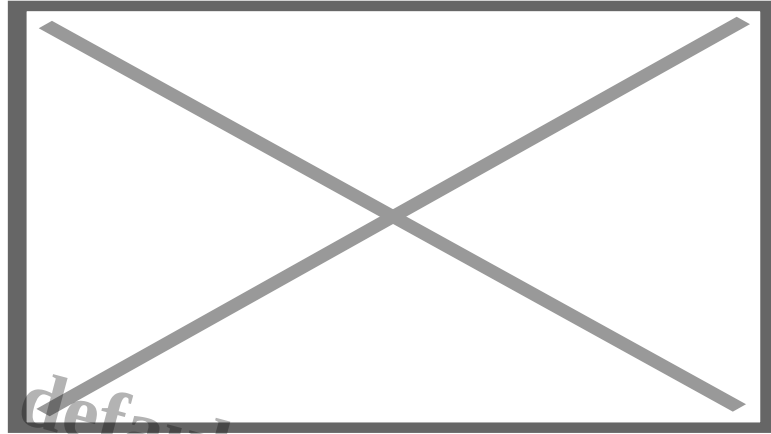


The science of Smaug the Terrible

Description



[Source](#)

Earlier this year, when the television show Game of Thrones came back on air, I wrote a blog post about how (if possible) dragons could exist. But, Game of Thrones is not the only medium where dragons dwell.

I am, of course, talking about the second Hobbit film, The Desolation of Smaug (pronounced sm-OWW-gh) which features a gigantic fire-drake with an ego to match who is known by many names: Smaug the Golden, Smaug the Impenetrable, Smaug the Magnificent, Smaug the Tremendous, Smaug the Terrible, Smaug the Stupendous, The Dragon Dread, TrÄ•gu, Lord Smaug.

But could dragons exist? Read on and find out!

**

In fantasy, dragons are practically omnipresent – good guys train them, bad guys abuse their power, they horde gold, kidnap princesses, murder thousands of people – or are simply a myth in the world’s history.

But, that is in a fantasy world – what about on Earth (or an Earth-like planet)? Could dragons exist?

According to Professor John R. Hutchinson of The Royal Veterinary College in London, UK, the discussion all comes down to size and gravity. When a land animal increases in mass, gravity quickly dominates all its activities because of the various pressures it exerts on the animal’s body (but an animal in water is a very different story, just compare an elephant – the largest animal on land – with a blue whale, the largest animal in the ocean).

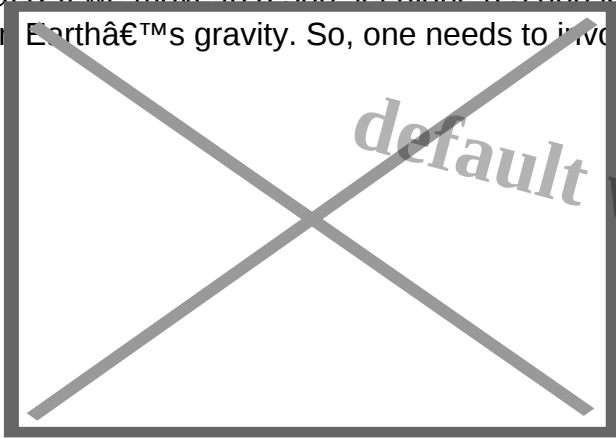
Now imagine an animal the size of a dragon – one long-dead in Game of Thrones was described as possessing jaws so big that it could swallow a mammoth whole and eclipse whole towns with its shadow. For much an animal to exist, it would need large bones to support its weight and muscles to move it, not to mention huge stores of energy to move and support such a large creature.

“Inevitably, the range of extreme activities that animals can do decreases as they get larger,” says Hutchinson. “So elephants don’t jump or gallop, whereas mice do; and large flying birds don’t whiz around like hummingbirds.”

One of the most identifying characteristics of a dragon is its ability to fly, but the problem of size rears its ugly head once again. As flying animals get bigger, their wing size needs to increase just as much, if not more.

“[A dragon] would need immense wings to support its weight,” said Hutchinson. “A lot of weight is wasted in that heavy tail and hind legs as well as the bulky head, too — those don’t help the dragon fly well at all. So at best such a smallish dragon would be a clumsy flier, and would have a hard time taking off.”

“If we move to a 500-let alone a 5,000 kilogram dragon, flight basically becomes out of the question in Earth’s gravity. So, one needs to invoke magic to explain a flying dragon.”



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[Source](#)

Therefore, in a world without magic, it looks like a dragon of any size would not be able to grow to such mythic proportions as described in various fantasy stories. But, what about if dragons were built like birds?

The largest bird found today is the California condor, with an average weight of 10 kilograms, a length of just over 4 feet and a wingspan of over 10 feet having been recorded (which is two and a half times its length!).

Conservatively, let us say that a dragon weighs 50 kg, and if it follows the same construction and weight distribution as a condor, then it would clock in at just over 20 feet in length and a wingspan over 50 feet.

Large? Sure. But theoretically possible.

But bigger dragons, like those described in Game of Thrones would be more like 500 kg, which would make their length 200 feet (or about two-thirds of a football field) with a wingspan of 500 feet (or the height of a 50-storey building!)

Suffice to say, even if it could exist, the physics alone would not allow such an animal to move, much less have enough energy to fly.

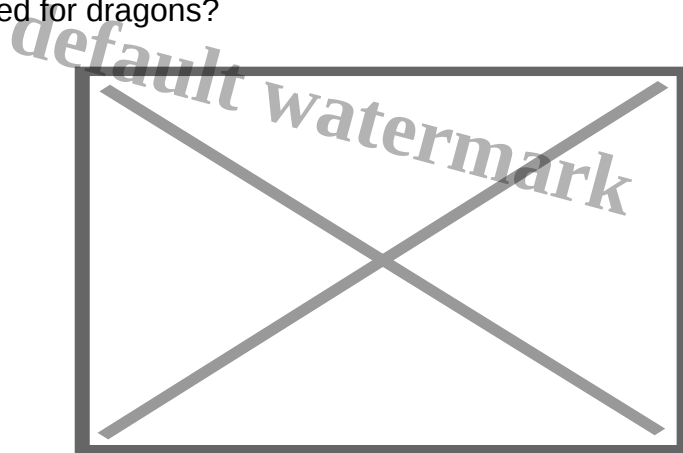
While dragons would not be able to fly or reach such massive size described across the globe, what about the other impressive characteristic of a dragon – its ability to spew fire?

According to Hutchinson, dragon fans will be disappointed once again.

While some animals, such as bombardier beetles, can excrete a hazardous and incendiary-type of fluid from their bodies on rare occasions for defense, fire-breathing it is not.

“Intensely hot flame takes massive amounts of energy to produce and to be hot enough to damage flesh, it would thus cook the dragon from the inside out anyway,” he adds. “I don’t see a realistic way that a very large animal could breathe some sort of fire-like substance. Tiny animals might get away with something like that on a small scale with chemical cocktails, but a huge animal would neither be able to fuel the energy needed to breathe fire nor avoid scorching itself. Again, magic (or a good imagination) is the only option to allow for such a creature.”

With fire-breathing going up in a puff of smoke along with monstrous size and ability to fly, what are we left with to satiate our need for dragons?

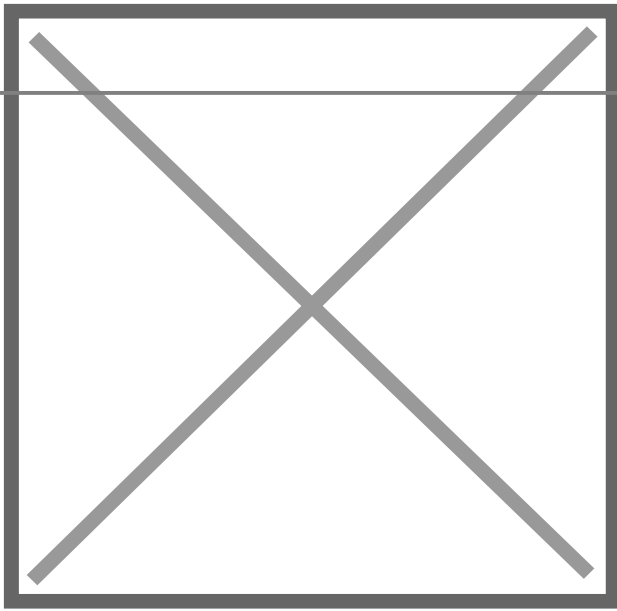


[Source](#)

Komodo dragons and Pterosaurs.

Komodo dragons are the largest living reptile on the planet, growing up to 10 feet and 150 kilograms, able to run up to 20 kilometres per hour and dive up to 15 feet. While not able to breathe fire, Komodo dragons do have a bad bite, filled with dangerous bacteria and venom – which they use to incapacitate and even kill prey with a single bite.

Pterosaurs, on the other hand, were flying dinosaurs existing millions of years ago. Hutchinson says that they could weigh 50 to 250 kilograms, have wingspans up to 36 feet and when standing, could be up to 18 feet (thanks to Brian Switek, paleontological guru for help with those numbers). Sadly, as with all dinosaurs, they have long since gone from this world.



[Source](#)

“We have had large sort-of-dragon-like animals in the past in the form of pterosaurs or even sort-of-giant eagles and vultures, but a real dragon in the sense of classic or modern fantasy just ain’t going to ever happen.”

Sadly, science tells us that dragons are merely a fantasy, but it doesn’t stop millions of people loving them. Just because dragons are an impossible flight of fancy on Earth, in the lands of Westeros and Middle Earth, anything is possible.

Category

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2. dragons
3. Science

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