The Evolution of Dragons

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The Evolution of Dragons

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Advisor: Kylla Benes
Introduction

- The first known depictions of dragons are from 4500 BCE. Over the centuries, they have been found in cultures around the world in everything from spiritual ceremonies to stories of the knights in shining armor hunting them down. Today, they have filtered into pop culture via Game of Thrones, Harry Potter, How to Train Your Dragon, and many others. But where did it all come from?

- It’s hard to say for sure, but the most likely answer is that humans all over the world were finding dinosaur bones and they all needed an explanation for them. But dragons have become so much more than glorified dinosaurs since then—there’s just something about giant lizards that we can’t seem to get over.
Introduction

– As a writer with a love for fantasy, dragons have always captured my imagination. Then I discovered another passion, evolutionary biology. After almost four years of working towards an undergraduate degree in evolutionary biology, I had to do a double-take at my favorite fantasy creature. They didn’t make any sense.

– Why did they have four legs and wings, when no other flying vertebrate ever has? Thick, heavy dinosaur tails on flying animals? Bat wings on a reptile? I needed answers. Surely there was a way to make a biologically feasible dragon—we just had to follow the laws of evolution.

– So I pulled together all of my knowledge of fantasy worlds and of the history of life on our planet, and I made an evolutionarily, anatomically, aerodynamically, and biologically correct dragon.
First: what kind of animal is a dragon?

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<th>Mammals</th>
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*A giant flying mammal might just be a giant bat. *Mammalian dragons would give produce milk for their young and be hairy, which I hate. (dragon milking—a dangerous sport?)*

*Though the huge terror birds were once the top predators of South America (think Kevin from Up), large birds lose the ability to fly and focus their strength in running (e.g. ostriches).* Honestly, the only real issue with Pterosaurs is that they don’t look like dragons.

- At first, their bat-like wings made me wonder if they might be mammals. Mammals are smart, and at the moment hold the record for biggest animal ever (blue whale). Our current largest land animal is the African elephant. Mammals are also fairly intelligent.

- But if dragons were mammals, they wouldn’t lay eggs, they wouldn’t look reptilian (unless you stretch some convergent evolution ideas), they would have fur, and they would nurse their young. Yikes.

- Birds? There have been some huge birds, but none of them could fly and none look anything like dragons. Feathered dragons are a no-go.

- Pterosaurs (pterodactyl and relatives) are technically the closest thing to a dragon that we’ve had. They got massive (the largest, *Quetzalcoatlus*, was the height of a giraffe), they laid eggs, they’re reptilian, but . . . they don’t look like dragons.
What’s a Scansoriopterygid?

• We now know that theropods other than birds evolved flight, and this special, recently discovered lineage of theropod actually had webbed wings. It was about the size of a squirrel and its niche most likely was climbing up trees and gliding down to catch insects in the air.

• It fits all the criteria except size, which we can fix with a change in niche and diet.
What would the wings look like?

- Wing structure is fascinating to study. Most winged creatures have the same bones, just differently shaped. We are accustomed to bat wings because they have five fingers just like us, but Pterosaurs also have five fingers; their wing is just a super-extended pinkie finger.
- Birds, however, only have three fingers and toes. Their fingers are melded together into the wing.
- The Scansoriopterygid is related to birds, and thus has three fingers and toes—but its fingers are spread down along its wing for climbing. The bone sticking down to make the wing is actually an elongated wrist bone, found in other gliding animals such as the flying squirrel.
What about the tail?

We love giving dragons dinosaur tails because it looks right for a giant reptile. However, dinosaur’s thick, heavy tails were for walking on land, in the case of sauropods, to balance out their long necks. We have to think about what kind of tails flying creatures have, because the body structure of flying creatures is very specific, for aerodynamics, weight, wing muscles, and stream-lining. Bats have tiny stub tails, birds have just feathers, and pterosaurs had anything from a stub tail to a long, very thin tail. We want dragons to have tails, but a heavy tail with little surface area to direct air would not be helpful.

Many raptors had reptilian-looking tails that had feathers at the end, and presumably they were able to fly with these, so this is what I gave my dragon.
Conclusion

As a science writer, I’ve spent years learning the importance of bridging the gap between scientists and everyday people. This project really gave me the opportunity to put all of my knowledge into practice. With this project, I got to apply the principles of evolutionary biology to a fantastic mythical creature. I hope that projects like these would help to inspire the public about the incredible field that is science, in a fun, engaging manner.