Short and sweet

Description

Every since Science Online 2013 ended, I have been very busy with a variety of things including work, developing some super-secret side-projects and more. But being busy is often a double-edged sword.

While these projects are developing and turning into some fantastic stuff that I am sure you all will enjoy â€“ it has left me with little time to read the ever-increasing amount of books I endlessly accumulate and post on this blog.

But, take heed loyal reader, as I have not forsaken you.

Over the past week and a half, Iâ€™ve been communicating with experts in various fields, and asking them questions that can come up in normal conversation â€“ for example: How can black holes exist if we cannot see them? Or, how hot is magma locked in the Earthâ€™s core?

The process is simple â€“ I ask an expert in a field four questions. They pick two and answer each in four sentences of less so that anyone can understand.

I hope to continue this series going, so if you have any ideas for experts or questions to ask, please do so in the comments!

Man, thatâ€™s heavy

The first expert is David Shiffman, a shark conservationist and ecologist graduate student in Florida. He blogs regularly at Southern Fried Science and tweets at @WhySharksMatter.

Question 1: Since it is right there in your Twitter handle, I must ask â€“ Why **do** shark matter?

Answer: Many species of sharks are top predators in their food chains. Top predators can influence their ecosystem both by regulating populations of prey, and by influencing the behavior of prey. In short, they help keep ocean ecosystems healthy.

Question 2: How can whales grow so big in the water, but the biggest animal on land (the elephant) is only a fraction of that?

Answer: The answer to this is simple- gravity. Thereâ€™s a limit to how big things can get on land because after a certain point they get too heavy. Water provides increased buoyancy. Blue whales are bigger than the biggest land dinosaurs ever were.

Short, stocky and strong

This leads perfectly into our next expert, Brian Switek, a freelance science writer who spends his life getting to know anything and everything he can about dinosaurs. He blogs at National Geographic and is on Twitter as @Laelaps.

Question 1: Who would win in an arm wrestle, an average man or a *T. rex*?

Answer: There would be no question. *Tyrannosaurus rex* would win. Estimates based on bio-mechanics indicate that the arm of *T. rex* was about three and a half times more powerful than that of the average person. The arms of *T. rex* were short and stocky, but very powerful.

Question 2: How did mammals survive the extinction event 65 million years ago and the dinosaurs didnâ€™t?

Answer: Actually, dinosaurs did survive. Avian dinosaurs â€“ birds â€“ escaped extinction and carry on the dinosaur legacy today. And even though mammals also survived, many mammal lineages died out in the catastrophe. Exactly why birds, mammals, and other creatures persisted while the non-avian dinosaurs died out, however, is a mystery that hinges on how climate change, volcanic activity, and asteroid impact translated into pressures that changed the world.

Invisible doesnâ€™t mean itâ€™s not there

The final expert is Matthew R. Francis, a physicist and science writer who writes at Bowler Hat Science and tweets at @DrMRFrancis.

Question 1: How do we know black holes exist if we cannot see them?

Answer: We canâ€™t see black holes directly, but many of them are surrounded by matter â€“ mostly gas stripped off stars or from other sources. When that gas falls toward the black hole, it forms a fast-rotating disk, that heats up and emits a lot of light in the form of X-rays and radio waves. So, even though black holes donâ€™t emit any light of their own, they can be some of the brightest objects in the Universe.

Question 2: What does E=mc^2 actually mean in terms of everyday life?

Answer: â€œE= mc^2â€• literally tells us that mass is a form of energy, and anything with mass will have that energy even if itâ€™s not moving. Most of the mass of your body is in the protons and neutrons in its atoms, but those are made up of the smaller particles known as quarks. The mass of a proton is a lot greater than the mass of the quarks that make it up; the rest of the mass comes from the energy that binds the quarks together. In other words, â€œE=mc^2â€• is responsible for most of the mass of your body!

Thank you very much to Brian, Matthew and David for all their help, time and effort â€“ and remember, if you have any ideas for experts or questions to ask, please let me know in the comments.

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Date Created
March 9, 2013
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