

# Rudolph, why is your nose so bright?

## Scientists at Johns Hopkins have an idea

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Holy glowing genes, Rudolph! If we didn't already know that Rudolph the Red-Nosed Reindeer was special, that shiny proboscis of his could have resulted from the one-in-a-million transfer of genetic material from a brilliant colored coral found in the Red Sea.

Perhaps it entered his mother's bloodstream when she scraped against the coral during a crash water landing while pregnant with Rudolph and then the DNA was passed to her unborn calf.

At least that's what a smart scientist from the Johns Hopkins University speculated might explain the nose so bright that guided Santa and his sleigh full of toys for good girls and boys on that famous foggy Christmas eve.

"Mobile genetic elements," said Steve Farber, principal investigator at the Carnegie Institution for Science and a Hopkins biology professor, "are derived from viruses and have the amazing ability to cut and insert chunks of DNA into the genome of

its host."

With a fist full of scientific journals and a wink, Farber joined two other top scientists from the university in offering explanations for Rudolph's nose, the Grinch's enlarged heart and Ebenezer Scrooge's time travel.

While most children and probably most of their parents accept the beloved holiday creatures as they are, scientists want us to understand the world around us, even if it's in a cherished Christmas storybook. Rather than suspending disbelief, scientists tend to look to peer-reviewed studies first to see if there is some solid explanation for what they've witnessed, or they craft their own trials, Farber said.

But launching the kind of large-scale rigorous studies most valued in science might be impossible with characters as unique as the Grinch and Scrooge (even though many of us know a few Grinch- and Scrooge-like characters).

Rudolph, however, might be as easy as a genetic test to identify the coral DNA. And his offspring would carry the genetic rearrangements containing it as well.

This time of year, it also might be tough to even schedule exams with the original trio, who are likely deep in the holiday crush in the North Pole, Whoville and 19th century London. None of them are in the university travel budget, either, Farber said.

So, the scientists just took a very, very educated stab at it. They do have advanced degrees in neurobiology, medicine and physics plus lots of lab experience.

Dr. David Kass, the Abraham and Virginia Weiss professor of cardiology, sought to explain how the Grinch's extra-small heart grew three sizes that day

as he had a change of heart about Christmas.

The easy answer was heart failure. But that likely would have made the Grinch feel more grinchy and less cheerful and way less likely to return all the presents he stole and carve the roast beast. He'd likely be weak and unable to lift his sled, Kass said. He also ruled out a ruptured valve, which can happen to people who abuse drugs, as well as high-intensity exercise given the creature's spindly appearance.

Then he considered the Grinch's green hue.

"He's a snake," said Kass, specifically a python. When they consume a large meal, many times their size, their hearts can balloon. The Mean One was said to have taken a roast beast in his night of pilfering. And he does do some slithering.

"The snake hypothesis covers a lot of bases," Kass said.

(Unknown to Kass when he initially hypothesized the Grinch was a snake, a scientific magazine had also linked research from a scientist in Colorado and her assistants to the Grinch. Those researchers raised pythons and noticed that an oily mix developed in their blood after a big meal that appeared to make their hearts rapidly enlarge.)

Even if it brought back Christmas for some Whos in Whoville, including Cindy-Lou, Kass does not recommend such an indulgence in red meat. In general, it's a no-no for the human heart.

Then there is Scrooge, the humbuggy old man who gets life lessons by glimpsing his past and future selves.

Ibrahima Bah, an assistant professor of physics and astronomy, said heading to the future involves moving at incredibly high speed. According to Albert Einstein's theory of special relativity, the clock ticks more slowly for someone moving fast, with the effect more dramatic as the person approaches the speed of light. Ten years in that person's reference frame can be 30 years to someone standing still.

"Time is a relative thing," he said. "It depends on the person observing it."

The bigger hitch is going back in time. He said negative energy could create some space-time loop allowing Scrooge to see himself as he was. The problem is, Bah said, negative energy doesn't really exist.

Or Scrooge could go back through a phenomenon called a naked ring singularity, which involves taking matter, spinning it fast and then collapsing it into a small area to create a rip in the fabric of space, he said. Also, not thought to be possible.

"I've proposed a number of ways this could happen, if you're willing to forgo the impossibilities in the system.

"I'm just having fun," added Bah, who's no humbug.

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