mystery science

Grades K-5
Mini-Lesson: “How do lizards regrow their tails?”

VIDEO TRANSCRIPT

VIDEO 1

Hi, it's Doug! A few years ago, I saw this beautiful little lizard hanging out in the sun on a sidewalk near the school where I was a teacher. I wanted to get a closer look, so I crawled on my hands and knees to sneak up on it. And when I got real close, I reached out my hand real fast to try to catch it but I made a classic beginner's mistake. I had grabbed the lizard by the tail. When I went to open up my hand, I found that the lizard had escaped, but I had a spooky surprise. Its tail was wriggling in my hand like a live worm. Someone named Jose has a question about lizards and their tricky tails. Let's give Jose a call now.

[Video Call]

- Hi, Doug!

- Hi, Jose!

- I have a question for you. How do lizards regrow their tail?

- Ooh, that's a great question.

You may already know why it was a mistake to try to catch that lizard by its tail. Lizards have the ability to detach their tails on purpose. And not only that but after they separate from their tails, they can regrow a new tail to replace the lost one. But you might be wondering why would a lizard get rid of its tail in the first place. What do you think?

VIDEO 2

I don't know how you answered, but it might help to think like a lizard. Like, imagine you're that lizard hanging out on the sidewalk by my school. You're having a normal lizard day, sunning yourself on the sidewalk. You know, thinking about what you're going to eat for your lizard lunch, when suddenly a huge creature, that's me, comes out of nowhere and tries to grab you. Now, I was only trying to grab the lizard to take a closer look at it, but the lizard didn't know that. From the lizard's point of view, I could have been a predator trying to eat it. If you were the lizard, you'd wanna make sure you could get away from the huge, monstrous human predator as quickly as possible. And you wouldn't want the predator to follow you. This might be why lizards detached their tails, to help them escape from predators. Even if a predator catches a lizard by its tail as the lizard tries to run, by dropping its tail, the lizard can still get away. And even better, the nerves inside the lizard's tail actually take a while to stop working. So the lizard's tail keeps wiggling, even after it's dropped it. That distracts the predator while the lizard gets to safety. But the most amazing thing of all is that even after they drop their tails, lizards don't have to live without them forever. Many lizards can actually grow their tails back again. And lizards aren't even the only animals who can do this. Salamanders can also regrow their tails. In fact, a specific kind of salamander, called an axolotl, can even regrow all kinds of different body parts, not just their tails, but their arms, their legs—even parts of their hearts. And as cool as that is, a type of worm, called a planarian worm, can do something *even* more incredible. If a planarian worm gets cut in half, it will regrow into two different worms. It can practically regrow its entire body. This ability to regrow lost body parts, scientists call regeneration. So how is this possible? Regeneration seems almost like a superpower. Well, to try to understand what's going on inside

a living thing, scientists often start with a microscope. All living things, when we look at their parts under a microscope, we see that they're made of these little blobs, which we call cells. Maybe you've heard that word before. Different kinds of body parts are made up of different kinds of cells. For example, muscles are made of muscle cells. Skin is made of skin cells, and so on. Now, different animals regenerate differently, but many animals, including lizards, start regenerating a lost arm or tail by growing something called a regeneration bud. A regeneration bud is a cluster of cells that can turn into more than one kind of cell, such as muscle cells, nerve cells, or skin cells. Scientists are really curious about how animals regenerate because learning about how it works might help us. Unlike a salamander, humans can't naturally regrow whole body parts like an arm or a leg. Scientists think if we can learn more about how lizards regrow their tails, or how axolotls regrow their heart cells, maybe we might be able to discover how to regrow our own body parts too. Now, human bodies do have some powers of regeneration already, like think about what happens when you skin your knee. Over time, the skin cells on your knee regenerate and grow new skin over your knee. That's how you heal. The same thing happens if you break a bone. As long as the broken bone pieces are held in place, after a while, your bones will regenerate new bone cells to heal the break. But that's not quite the same thing as what lizards do to regenerate their tails. To regrow a human arm, for example, we'd need to regenerate skin cells, muscle cells, bone cells, and more all at the same time. And unlike lizards and salamanders, human beings can't easily regenerate body parts that big and complicated. Our natural ability to regenerate cells also slows down as we get older. This is a big part of how people age. So discovering the secret to human regeneration isn't going to be easy, but even though we haven't figured out yet how to make regeneration work for our own bodies, we human beings do have our own superpower, and that's the ability to use our minds to adapt. Humans are really good at learning to do things in new and different ways after our bodies

change. Like if you've ever lost a tooth, you might've experienced this. Maybe when your tooth first fell out, your mouth felt like it had a strange hole in it and it was a little harder to eat or talk, but over time, your mind and body adapted to the change. You learned to eat and talk comfortably again, even with that new missing tooth hole. Another way humans adapt is by inventing tools that help us use our bodies as they are. For example, even though human bodies can't naturally run as fast as cheetahs can, we've invented cars that can help us move even faster than a cheetah. Even though people don't grow thick coats of fur to keep us warm in the winter, like polar bears, a person living in a cold place might wear mittens or a jacket to keep warm. And even though we can't regrow our legs like a salamander can, a person who loses a leg might use a prosthetic leg to walk or play basketball. By using these tools, we don't change our bodies, we make it so that we don't need our bodies to change to do all the things we need to do. Now, that's not something lizards or most other animals in the world know how to do. Still, there are some things that lizards, and salamanders, and worms can do that humans just can't. Until we figure out the scientific secret of regeneration, we just have to admire lizards regrowing tails for the superpower that it is. That's all for this week's question. Thanks, Jose, for asking it!