Lesson: “What kinds of animals might there be in the future?”

VIDEO TRANSCRIPT

EXPLORATION VIDEO 1

Trilobites, dinosaurs, woolly mammoths. These are all animals that went extinct. They're gone forever. But could we ever get new kinds of animals? Can we human beings even create or invent animals? Scientists haven't figured out how to invent animals yet, but we can slowly change how animals look. We do this by breeding two different animals together. That sounds genius, right? Now, I don't mean any two animals. For example, say you wanted a dinosaur-looking animal. You might consider starting with a giraffe and crossing that with an iguana. That would certainly look very dinosaur-like, but this will not work. In order to have babies, the animals have to be similar to each other. They have to be the same *species*, or same kind of animal. A giraffe and an iguana are totally different from each other. They're not even close to being the same species. One is a furry horse-like mammal. The other is a scaly lizard reptile. It just won't work. But now, two different iguanas, say a mother iguana and a father iguana, they are the same species. They can definitely have babies together. So how would we change how iguanas look by breeding them together? I mean, all iguanas look pretty much exactly the same, right? They're green, they’ve got scales, they’ve got spikes, but they really don't all look exactly the same. There are always small differences between each one. Say, for example, that these two iguanas had babies. What you notice is that, for the most part, all the babies look like their parents. They're all green, they have spikes on their back, they all have

nice long tails, but they're not all exactly the same. For example, this one right here is slightly smaller than the others. And this one is slightly bigger than the others. This one has a few more spikes on his back. This one is a little bit yellow. And this one is a little bit blue. Say the one that was a little bit blue really caught your eye, and it happened to be a girl iguana. You thought, ooh, now I wish I could have even bluer-colored iguanas than this. So you visit your friend who's been raising iguanas. Here's some of the iguanas he's got. If you wanted to get even bluer iguanas, which of your friend's iguanas would you pick to have babies with your iguana? Why?

EXPLORATION VIDEO 2

So, of your friends iguanas, you should pick the one that's slightly blue and let it have babies with your iguana. And now, when those two slightly blue iguanas get together and have babies, all of their children will tend to be slightly blue as well. Notice two things. One is that babies always look like their parents, so all of the baby iguanas are just a little bit blue. There's not any that are slightly yellow-colored like there was last time. But notice something else too. Because no two iguanas are ever exactly alike, there are always slight differences. So one baby might be a little bit more green, kind of like its grandparents. But because the parents we started out with this time were both slightly blue, we now get a baby that's even a little bit more blue than its parents. That's just one of these tiny ways in which no two iguanas are exactly alike. This one turned out slightly even more blue than its blue parents. Do you see what this means? If we take this even bluer iguana and we breed it with another slightly blue iguana, we might wind up with an even bluer iguana. This process is called selection, because we're choosing or selecting a certain trait that we want to see more of. In this case, we wanted to create iguanas that were more blue. So with each set of babies, with each generation, we keep choosing, we keep selecting, the bluest iguanas we can get. And then we only let them have babies. So if you do

this generation after generation, you'll wind up with iguanas that tend to be really blue-colored instead of green-colored. And just so you know, iguana owners have actually done this. It's now possible to have a blue iguana as a pet. It's not that they've created a new kind of animal. It's still an iguana, but we just say it's a new breed of iguana—blue iguanas. And here you can see they've managed to create some other breeds of iguanas as well. Isn't this awesome? Selection isn't just used on iguanas. It's used on lots of different animals. It's all around you. For example, have you ever noticed how there's so many different breeds of dogs? There's rottweilers, dachshunds, Labrador retrievers, cocker spaniels, poodles, and the list goes on and on. Well, a few thousand years ago, it used to be that there was only one breed of dog. We don't have pictures of it, but scientists have reason to think it looks something like this. It was a medium-sized dog, and it probably looked pretty wolf-like. In fact, you might call it a wolfdog. People in ancient China were some of the first people to use selection to change how this ancient wolfdog looked. The Chinese royalty, the king and his family, they wanted a smaller breed of dog, ideally a dog that could sit on their lap while the royal family sat on their thrones. That must have seemed like a really impossible idea to people at the time. I mean, imagine a wolf-sized animal being changed to be small enough to sit on your lap. Remember, at that time, all dogs were medium-sized. But that doesn't mean they were all exactly the same. Some were a little bit smaller, some were little bit bigger. So the Chinese royalty searched for and selected the smallest of the medium dogs they could find and only let those dogs breed and have puppies. They did that over and over, each generation carefully selecting out the smallest puppies each litter and only allowing those dogs to go on and have puppies of their own. This took a long time to do—many, many generations of dogs. But eventually, after enough time, that's how we got the very first small dog breed. It's a breed we still have today. It's called the Pekingese. For hundreds of years, the Pekingese was carefully guarded by the Chinese royalty.

They didn't want anyone else to own them. But eventually, about 200 years ago, some of these dogs were captured in China by the British and taken from China and brought back to Europe. From there they've spread, so it's now possible for anyone to buy a Pekingese. Think about that next time you see one. Every single Pekingese today is a direct descendant from the dogs owned by ancient Chinese emperors. Now that you know how the first small dog breed was created, how do you think we've got all the other breeds? For example, how do you think we created big dogs, like the Great Dane?

EXPLORATION VIDEO 3

Selection isn't just about changing dogs so that they can sit on our laps. We've been using selection since ancient times on all kinds of animals. This is an African wildcat, which lives in the deserts of Northern Africa. They're a wild animal, which, if you tried to pet or hold on your lap, would probably hiss and scratch you with its sharp claws. I mean, they're wild. They're not house cats. But through selection, over many years, we've created lots of different cat breeds, just like we have different dog breeds. There's tabby cats, calicos, Siamese, and Maine coons, just to name a few. These breeds don't look too different from the African wildcat, but we've chosen only those cats which are most tame. So that's why modern house cats are tame and make good pets. Farm animals are another great example of where human beings have been using selection. Take cows, for example. There hasn't always been farm cows. Instead, there used to just be a type of wild cow called an *auroch*. Human beings realized they could capture aurochs and that some aurochs produce slightly more milk than others. So, over many generations, we've selected for aurochs that have bigger and bigger utters. That's the part of the cow that makes milk. Today, that's the breed of cow that we call a dairy cow. And still other aurochs were selected because they were slightly more muscular and so were good for helping

out with hard work, like pulling wagons and plows on farms. After many generations, this has led us to having a breed of muscular auroch called *oxen*. There's even one breed of oxen cow that's incredibly muscular today. Look at this thing. Our ancient ancestors wouldn't believe their eyes if they could see this. Truly just about every kind of pet and every kind of farm animal you can think of has been changed by people. It started as some kind of animal in the wild, and we used selection to make it more tame or more useful. We have chickens that lay bigger eggs, sheep that have more wool, and horses that can run faster and faster. Selection has made all of this possible.

EXPLORATION VIDEO 4

All of these animals we've been talking about are some of the more ancient or older examples of how we changed animals using selection. But selection isn't just a thing of the past—it still goes on today. In more recent times, scientists in Russia have used selection in order to change some foxes to be more friendly and not as afraid of people. Because of this, some people in Russia now have foxes as pets. This hasn't become popular in the United States yet, but maybe one day it will. One scientist has even come up with an idea for how to possibly create a pet dinosaur. His idea is to use chickens. Yes, chickens. No one's done this yet, but it might be possible to keep selecting chickens that have longer and longer tails and shorter and shorter wings. If that works, we would end up with an animal whose skeleton would go from looking like this—this is a normal chicken skeleton—to looking more like this. Now you've got to admit, that does kind of look like a mini T-Rex. In fact, the scientist calls his idea the *chickenosaurus*. On the outside, it might look like this. So, you can see, it would still be a chicken, just a T-Rex-like chicken—but without being huge and having ferocious teeth, which is definitely a plus. Maybe one day someone will create the chickenosaurus, and so we'll have our first sort of pet

dinosaurs. Now, while we're talking about animals that might be invented in the future, I have to tell you one more idea. A friend of mine has always wondered why we don't use selection on wild bears to create a breed of smaller, cuddly bears. Imagine that: real-life teddy bears. Now, this is just a teddy bear, no one has succeeded in selecting bears too much. It turns out they don't make good pets, but all of this is fun to think about. Now that you know selection makes it possible to slowly change how animals look over time, what's an animal or a trait you might like to see in the future?

ACTIVITY INTRODUCTION VIDEO

Today, you're going to do an activity called Designer Dogs. Let me give you a little background information, and then you can get started. You've now learned about how we think that one breed of dog, the Pekingese, was created from the original ancient wolf-sized dog. It was thousands of years ago that people started selecting different traits of the wolfdog and creating all the many different breeds of dogs that exist today. In fact, today we think there might be as many as 300 different dog breeds. Now that we have all these breeds, we can also combine them and create even more dog breeds. That's what our designer dog activity is all about. You'll see two different breeds. For example, here we have a Labrador and a poodle. Now, what happens when these two breeds are combined? In other words, there's a Labrador for the mother dog and a poodle for the father dog. When they have puppies, what will the puppies look like? Well, we'll show you three different puppies, but only one of them is the correct answer. You need to figure out which puppy belongs to these parents. Can you guess? The correct puppy will have something in common with the mother and something in common with the father. In this case, it's this puppy, because notice, unlike the other puppies, it has at least one trait of its mother and one trait of its father. It's got the dark color of its mother, the Labrador, but

the curly hair of its father, the poodle. By combining a Labrador with a poodle, we've created a new breed: the Labradoodle. The two dog breeds have been combined to make a new breed. So, are you ready to play? To play this game, you'll need a pencil, a partner, and the two “Designer Dog” sheets. Now, on the worksheets, you'll see pictures of two dogs and three puppies. Talk with your partner about which puppy you think belongs to these parents, and then on the “Designer Dog” sheet, circle the puppy that you think is right. Write down why you think it's the right puppy in this space right here, and then come up with what you think would make a good name for this new breed. If you want to see any of these pictures in color, we've got them on the next slide if your teacher wants to show them. Are you ready? Let's play.

FOLLOW VISUAL ACTIVITY ON WEBSITE - NO NARRATION