Lesson: “Where can you find whales in a desert?”

VIDEO TRANSCRIPT

EXPLORATION VIDEO 1

Hi, it's Doug! This is where I grew up, the state of Illinois, USA. It's located smack-dab in the middle of the United States, and it's all grassland. No mountains, no ocean, just grass and cornfields as far as the eye can see. This is what I saw every day when I woke up. But one day, my dad got me up and said, "Hey, come hop in the car. We're gonna go somewhere special. We're gonna see a part of Illinois that's not like anything you've seen before." "Where are we going?" I asked. "The quarry," he said. "The what?" "You'll see." At first, when we got there, I didn't see anything. It was still flat grassland, just like everywhere else in Illinois. But then, as we got closer, I started to see something. There was a hole, a giant pit in the ground. "Don't get too close to the edge," my dad said. It was a big drop down to the bottom, about 500 feet down. My dad explained to me that a quarry is a place where people dig rock out of the ground in order to use it for construction. We drove down a long, steep road, down to the very bottom of the quarry and took a look around. Standing there, at the bottom of this pit, it was impressive. I could see the grass and the trees up at the top. That's the world I was used to. But down at the bottom of the quarry, it was like a different world. No grass, no cornfields. This world was made of solid rock. I went off to look at the walls of the quarry, to look closer at this solid rock. I was curious to see what the earth underneath my house looked like. As I looked at it, that's when I noticed what looked like holes in some of the rocks. But I could tell by looking at these, these weren't

just holes. They had some kind of pattern to them. They reminded me of seashells. My dad said to me, "Those are shells. Or, I should say, they were shells. They're fossils, the remains of animals that lived a long time ago." Whoa. As soon as I realized I could find fossils here, I started looking all around. And as I looked all over the quarry, that's when I found this. This was no shell. This was something totally different. What do you think it was?

EXPLORATION VIDEO 2

Maybe you thought, is that an arrowhead? An arrowhead is a piece of stone that's been sharpened to use for hunting. This did feel like stone, and it was sharp on the edges, but it didn't look like something a human being made. It looked like something natural. Like some part of an animal. But what? In ancient times, when people would find one of these, some people called it a tongue stone, because they thought it looked a bit like a tongue. But we know today, that's not at all what it is. By comparing it to parts of animals living today, scientists noticed it looks an awful lot like these. Shark teeth. As you can see, shark teeth have these little ridges on the side, kind of like the blade of a saw. Well, look again at the fossil I found. It has these saw blade-like ridges, too. Look how similar they look. Somehow, here at the bottom of this quarry was a fossil shark tooth from a shark that lived a long, long time ago. After finding these in the quarry, I was really excited. I wondered: what other fossils could be found in this quarry? What do you think?

EXPLORATION VIDEO 3

I'm not the only one who's looked for fossils in the quarries of Illinois. In some of these same quarries, other people have found fossils like this. Can you tell what it is? It's a crab. And these, they're fossil starfish. And this. Look, you can see it has fins right here, and right here is its tail fin. Fins? These are traits of a fish. I started to realize something strange about all these fossils

in the quarries of Illinois. Shark teeth, shells, crabs, starfish. If you look at their traits, you can tell that they're all animals that live in the ocean. But the ocean's not anywhere close to where these fossils were found. I found a shark tooth in a quarry in the middle of the cornfields of Illinois. Remember, Illinois is about as far as you can get from the ocean. It's nearly 1,000 miles away. The animals that live in Illinois and the other central parts of the United States are animals like deer, raccoons, bison, and hawks. None of these are animals that have anything to do with the ocean. Look at them, they have long legs for walking or wings for flying. Traits that help them live on land or in the air, not in the water. But sharks in Illinois? Just imagine them living in a grassland. Sharks have fins and flippers. It's not like you're gonna see land sharks swimming among the cornfields. So, this was very weird. Why would there be fossils of sharks and other ocean animals in the middle of the cornfields of Illinois? What clues could this give us about what Illinois has looked like over time?

ACTIVITY INTRODUCTION VIDEO

In today's activity, you'll be going on a fossil dig. I wish we could dig in the ground beneath you to see what types of fossils there are. Though we won't be able to go on a real fossil dig, you'll be using a model of a fossil dig. And you'll still make the same kinds of discoveries. You'll use what you already know about animal traits to figure out what the habitat looked like when these animals were alive. Then you'll use that information to solve some mystery fossils. I'll show you how to get started, step by step.

ACTIVITY STEP 1

Find a partner. If you're working alone that's okay too. When you're done with this step, click the arrow on the right.

ACTIVITY STEP 2

Get these supplies. You'll get more supplies later.

ACTIVITY STEP 3

Let's prepare your fossil dig. Write your name on this “Fossil Dig” sheet, then cut along the two dotted lines on this page until you reach the stop signs, just like this.

ACTIVITY STEP 4

Okay, now it's time to put your model fossil dig together. First, put the page that you just cut on top of the other page, making sure to line up the corners and the edges. Now you're going to put stickers near the three arrows. Add a sticker near each arrow, like this. Put half of the sticker on the top page and fold it over to the back. That will connect the two pages together. Put the other two stickers next to the other two arrows, in the same way, folding them in half. When you're done, it should look like this. Your two pages should now be connected.

ACTIVITY STEP 5

Now you're going to start digging for fossils. Open the flap that's covering the top layer, Layer A of your fossil dig, and fold it flat like this. Examine the fossils that you find in this layer. Then, go to the next step.

ACTIVITY STEP 6

Look at the traits of each fossil. Then, fill in question number one on your worksheet and discuss with a partner.

ACTIVITY STEP 7

Discuss these questions. Then, fill in question number two on your worksheet.

ACTIVITY STEP 8

Let's keep digging. Open the flap that's covering Layer B of your fossil dig and fold it flat like this. Examine the fossils that you find in this layer. Then, go to the next step.

ACTIVITY STEP 9

Fill in question number three on your worksheet and discuss with a partner.

ACTIVITY STEP 10

Discuss these questions. Then fill in question number four on your worksheet.

ACTIVITY STEP 11

Now you'll get some “Mystery Fossils.” These are fossils that were found in the same place as your fossil dig, but they got all jumbled up, so we don't know which layer they came from. You'll have to figure out which fossils came from Layer A and which ones came from Layer B. Just get these supplies for now. Once you've got them, go to the next step.

ACTIVITY STEP 12

Go ahead and cut out your Mystery Fossils, like this.

ACTIVITY STEP 13

Observe the traits of your Mystery Fossils. Sort them into two piles. One pile for the fossils that you think came from Layer A, and another pile for the ones that you think came from Layer B. It's okay if it's hard to tell where some of them belong. Just carefully observe their traits and try to make the best claim you can.

ACTIVITY STEP 14

Once you've decided which layer you think each fossil came from, put them into their fossil layer on the page. Then glue them in. When you glue them, try your best not to cover the other fossils.

ACTIVITY STEP 15

Discuss these questions.

ACTIVITY STEP 16

Discuss these questions. Then, be sure to watch the next video.

WRAP-UP VIDEO 1

In the activity, you discovered that there could be different kinds of fossils in different layers of rock below the ground. In the top layer of rock, there were fossils of animals with traits like having legs to walk. Others had wings to help them fly. Clearly these are fossils of animals that had once lived on land. But below that layer was a layer of fossils from different animals. These animals had traits like flippers and fins, or shells on their bodies. These were animals that had

once lived in the ocean. We can use our model of a fossil dig to explain the real fossils from the quarry in Illinois. Those ocean fossils found in the middle of the Illinois grassland tell us that somehow the grassland of Illinois really did use to be the ocean. In other words, somehow, far back in time, scientists think as far as millions of years ago, there was a big switch in Illinois and other parts of the central United States. A place that had been an ocean habitat, where there were animals like sharks and crabs and starfish, dried up somehow and changed into a grassland habitat, where today we find animals like deer and hawks and raccoons. Fossils have shown us that Illinois changed habitats. But was this just something weird that happened in Illinois in the central United States? Or could other places in the world have changed habitats too? What do you think?

WRAP-UP VIDEO 2

We learned that the habitat in Illinois has changed over time. But what about other places? Have they changed too? To figure this out, you would need to dig down into the ground to look under the surface of the Earth and find fossils. Once you find fossils, consider what you see. What traits do the fossils have? Where would they have lived? Fossils can give us clues about what the habitat used to be there. Scientists have done exactly this. They dug down into the ground in different places all over the world to see if the habitats have changed there too. Take the Sahara Desert, for example, on the continent of Africa. Today, the Sahara is one of the hottest, driest places in the world. Temperatures often stay above 100 degrees Fahrenheit for months at a time. With so little rain and such hot temperatures, almost nothing can live here. It's just sand dunes as far as the eye can see. But scientists go digging underneath that sand, and when they do, they discover amazing things. Like this. The skeleton of a giant animal. If you can't tell what it is, here's its jaw bone. It's a whale. And this isn't the only one they found, either.

They find lots of them. In the Sahara Desert. Whales were once common in this area. But whales swim in the ocean, they can't live in a desert. What this tells us is that this place where today there's a dry, hot desert, there was once an ocean. And that's not the only habitat that's changed. Traveling back towards North America, consider this place: the Gulf of Mexico. A habitat of salty seawater connected directly to the Atlantic Ocean. Recently, after a really big storm stirred up the water, there were some people scuba diving about 10 miles from the shore and they discovered this: it's what's left of a forest. The storm waves were so strong they had torn up parts of the ocean floor, and underneath this uncovered a bunch of fossil trees just sitting there on the bottom of the ocean. Some of them still had roots in the ground. They're Cyprus trees, still found today on land, never in the ocean. So here was a case where part of an ocean was once land. In this case, a forest. As one last example, take a look at one of the most extreme habitats on Earth: Antarctica. Antarctica today is a polar habitat. Temperatures dip down to minus 70 degrees Fahrenheit. It's the only continent where no human beings live permanently—it's too cold. Freezing cold with not a single tree that can grow there; the only animals you might recognize are penguins and seals with thick fur. But scientists have dug down under the layer of ice into the rock beneath it, and what they found are fossils like this: it's the fossil of a tropical fern, a fern found only in jungles. Antarctica today might be a permanently-frozen, icy habitat, but it was once a warm, tropical rainforest. So what we've seen is that it's not just Illinois, where I grew up, that's changed. Most places have changed habitats over time. From wet ocean to dry land, or from dry land to wet ocean. Even places we might think of as impossible to live in today, where it's freezing and everything is covered in ice, weren't always this way. Some might have been warm, tropical rainforests full of life. By looking at fossils, scientists have found evidence that habitats haven't always stayed the same. Habitats have changed all over the world, which kinda makes you wonder: if you dug down in the ground

where you live, what fossil creatures could you find? What hidden world of the past might be found right under your feet? Think about that. Have fun and stay curious!