The Maiasaura *Dig: The Story of Dr. Holly Woodward Ballard*

Early Years

When I was a kid growing up in North Carolina, I always knew that I wanted to be a paleontologist. My earliest memories include looking through dinosaur books, drawing dinosaurs, and playing with dinosaur toys.

I went to college to pursue my dream. I studied geology, which is the study of rocks; and biology, which is the study of living things. This helped me understand how extinct animals lived.

Dr. Holly Woodward Ballard using an awl, a brush, and a whisk broom to excavate Maiasaura *bones.*

Dr. Horner and the *Maiasaura*

One of my professors in college was a world-famous paleontologist named Jack Horner. He is best known for his discovery of the *Maiasaura*. *Maiasaura* means "good mother lizard."

Dr. Jack Horner in 2018 close to Egg Mountain, surrounded by the Rocky Mountains.

In Montana in the 1970s, Dr. Horner made an unusual discovery. He found the fossil remains of eggshells and adult and baby *Maiasaura*. This was the first evidence that at least some dinosaurs cared for their young. Dr. Horner's discovery helped people start thinking of dinosaurs as active, bird-like animals instead of sluggish reptiles.

Dr. Horner and his team also found eggs and **embryos** from other dinosaur species in the same field. This area came to be known as "Egg Mountain."

The Maiasaura *field area in Montana, also known as "Egg Mountain."*

The Bonebed

A few summers later, Dr. Horner and his crew found a gigantic field full of bones (called a bonebed). The bonebed had hundreds, maybe *thousands* of baby and adult *Maiasaura* fossils.

You might be wondering how so many fossils ended up in one place! After studying the rocks and fossils in the bonebed, Dr. Horner and his team think that a huge **mudslide** brought the bones to the field. 76 million years ago, mud swept through the **floodplain** (low-lying ground close to a river). The mud carried many *Maiasaura* skeletons with it. They all ended up as a jumbled mess of bones in what is now the bonebed.

Dr. Horner suggested that I gather the fossils from the bonebed to learn more about the *Maiasaura*.

So, I collected many of the *Maiasaura* bones and examined them in a lab. I used a microscope to look very closely at polished, thin sections of bones. I looked closely at the fossilized bones from many different *Maiasaura*. By studying them, I was able to figure out how long it took for them to grow to their full size.

The Search for the Tiniest Bones

Every bone discovery is exciting for me. But you might be surprised to hear that the smallest *Maiasaura* bones, not the largest, are the most thrilling to find. This is because we still know very little about how dinosaurs grew up from tiny hatchlings into adults. So, the tiniest bones can give us the most important clues.

On my latest dig at the Brandvold **Quarry** (in the Egg Mountain area), I was on the hunt for baby bones. But there were so many bones in the quarry! How would I find a tiny bone in the piles of large and broken bones? I wasn't sure that my search would be successful.

The area where my crew and I were digging is surrounded by hilly grassland. The grass is normally a deep green, but it was beginning to turn golden yellow from the summer sun and heat. We could see the jagged Rocky Mountains to the west.

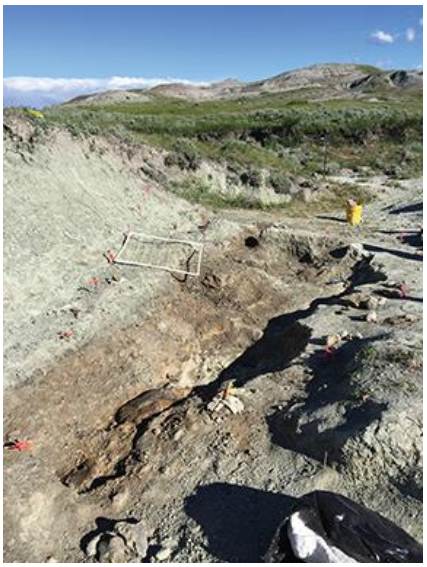
The Brandvold Quarry is about 64 square meters. A crew that had been there before us had already removed about 15 feet of rock. This exposed the fossil layer. At first, we needed to remove the **sediment** on top so we could get to more of the bones. We used shovels and pickaxes to scrape off the sediment, and then we loaded the dirt and rock into a wheelbarrow and removed it from the site. Sometimes the rock was so hard we even had to use a jackhammer.

Before long, we were only about 2 feet above the bone layer. We started using smaller hand tools like **awls, whisk brooms,** and brushes. Gently, we removed the rest of the sediment and uncovered the bones.

A whisk broom, awl, chisel, and a brush resting on a Maiasaura *bone.*

There were so many bones! We found them almost anywhere we dug! We could spot them in the gray mudstone because of their dark black color. We could also identify them by the sound they would make when scraped by the awl. The bones sound like porcelain or glass when scraped, but the mudstone sounds more dull. The shape and texture were our last clues. Bones are usually symmetrical in shape and if a bone is broken, the inside looks sort of spongy.

Every time we found a bone, we would record it. We used meter-squares in the field and grid paper. Data collection is so important in paleontology. It can help us understand the environment where the bones were buried and the age of the rocks. Sometimes we can even figure out the cause of death.



Brandvold Quarry with meter square grids marked with flags.

It was nearing the end of our time at Brandvold Quarry. We had found so many bones, but I was beginning to think we wouldn't find any tiny ones. But then, on one of the last days, a tiny black line caught my eye. I carefully removed pieces of mudstone from around the bone. Then I gently brushed the bone surface, applying a special glue to the bone as I went. Once the entire surface was uncovered, I could see that it was a tiny *Maiasaura* **femur**. The bone was only about 15 centimeters long (about 5 and half inches). At last, I had found my tiny bone!

The Maiasaura *femur was 15 centimeters long, or about 5.5 inches, which is a little shorter than a sharpened pencil.*

I recorded my find in the meter-squares in the field and on grid paper. I couldn't wait to tell my team. After the dig, I planned to take it back to my lab. I wanted to analyze the bone so I could learn more about the dinosaur's age and how fast it grew.

At the end of the dig, my team and I were so excited about all of the *Maiasaura* bones we had found. We were the first human beings to uncover the remains of these awesome creatures from 76 million years ago! And I was especially thrilled to have finally found the tiny femur. What an incredible feeling!

Dr. Woodward Ballard pointing at a tiny fossilized bone in the Maiasaura *bonebed.*

Written by Casey Schultz for EL Education.
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Glossary

awl: a tool used to make holes in leather or wood. Awls are small and have a sharp point.

embryo: an animal or plant that is just starting to develop. An embryo grows inside an egg, a seed, or its mother.

femur: the long bone in the leg in primates, or the hind leg in quadrupeds, extending from the pelvis to the knee; thighbone.

floodplain: a wide, flat area of land adjacent to a river that overflows its banks periodically.

mudslide: a flow of mud and debris down a gradual slope. *The highway was closed due to a mudslide, which also caused damage to houses in the area.*

quarry: a large open hole or pit dug for mining stone, marble, or the like.

sediment: material deposited by water, wind, or ice. *The glacier left behind a sediment of rocks as it melted.*

whisk broom: a small, short-handled broom, used to brush or sweep clothes, raised surfaces, and the like.

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