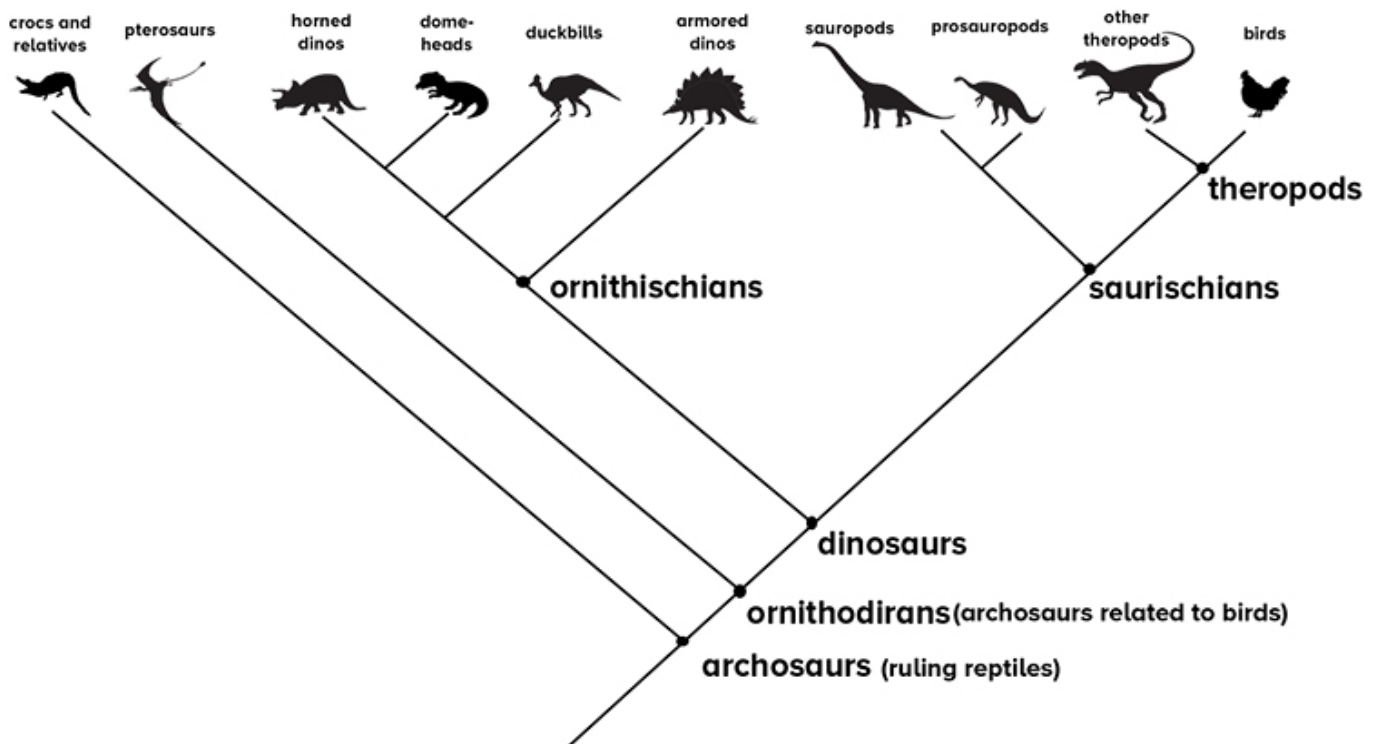


# Dino-chicken: exploring ancestors



**Introduction:** Today, you are a paleontologist, a scientist who studies the history of life on Earth through the fossil record. Your mission is to evaluate the following theory!

**Theory:** Chickens are the closest living relative to the *Tyrannosaurus rex*.



## Station 1: Anatomy (Body features in the fossil record)

**Part A:** By looking at the fossil record, we can see that several dinosaurs including the *T. rex* had bone structures that were similar to modern day birds like chickens.

Dino bones look like bird bones. Just by simply looking at the bones we have today you can easily see that they look more like birds than any other animal. This is actually the first thing that led researchers to believe that dinosaurs were closely related to birds. For instance, look at the bones of a chicken next to the bones of a Velociraptor below. They are not identical but strangely similar. (Source: Are Chickens Related to the *T. rex*?, [dino-kidz.com/are-chickens-related-to-t-rex](http://dino-kidz.com/are-chickens-related-to-t-rex))



### Part B: Wishbones

Modern-day birds including chickens and turkeys have wishbones. But did you know that theropods like the *T. rex* also had wishbones?! Take a look.



Note: At left is a wishbone from a family of dinosaurs which included the *T. rex*. Just below is a wishbone from a modern-day chicken. (Source: Carving the holiday dinosaur: a phylogeny of wishbones, [kqed.org/quest/290/carving-the-holiday-dinosaur-a-phylogeny-of-wishbones](http://kqed.org/quest/290/carving-the-holiday-dinosaur-a-phylogeny-of-wishbones))

**Task:** List the body features that are alike and different between the dinosaur and bird skeletons.

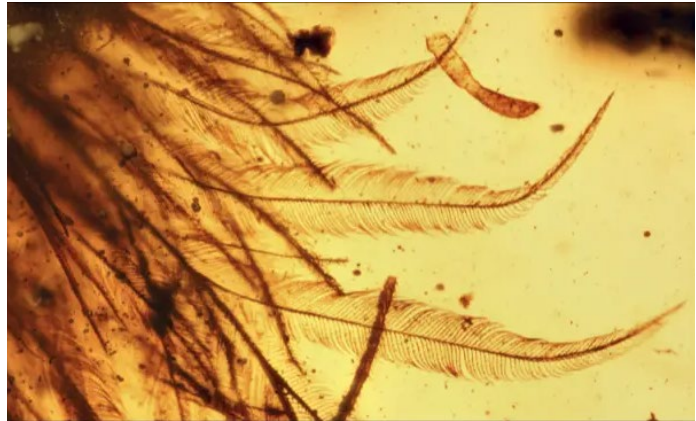
## Station 2: Feathers

Over the years you may have noticed that there have been more and more pictures of dinosaurs with feathers. Our traditional ideas about what Velociraptors or even the *T. rex* looked like are now shifting from reptile-like to bird-like.

This is because paleontologists have determined that dinosaurs are more like birds than any other animal. When did this all start? Well... as far back as 1964 when John Ostrom discovered the *Deinonychus*. He strongly believed that it was warm-blooded.

Then, in 1979, John McLaughlin suggested that many dinosaurs were feathered.

Finally, In 2011, samples of amber from the Cretaceous era were discovered that contained preserved feathers. This led paleontologists to conclude that some of the feathers were used for insulation and not flight.



*Yutyranus*, described in 2012, are the largest known dinosaurs with feathers—a patch of fossilized skin shows shaggy body feathers, similar to an emu. *Yutyranus* was related to *T. rex* and measured 30 feet long and weighed more than 3,000 pounds. (Source: Are Chickens Related to the *T. rex*? [dino-kidz.com/are-chickens-related-to-t-rex](http://dino-kidz.com/are-chickens-related-to-t-rex))



**Task:** Use the magnifying glass in your foldscope kit to examine the chicken feathers at this station. How are they alike and different from the feathers shown in the picture above? Sketch each type of feather and label the similarities and differences you see. It was suggested that some dinosaur feathers were used for warmth instead of flight; compare this to the role of a chicken's feathers. Share with your partner.

### Station 3: Collagen (Protein evidence)

In the past, scientists examined whole body parts to infer which animals of the past and present might be related. Then scientists developed DNA and body tissue analysis and are able to compare the body tissues of organisms too. They could compare the body tissues of organisms too.

However, gathering DNA or body tissue from fossils seemed impossible because they quickly break down when an organism dies. Then a groundbreaking discovery was made.

To get molecular evidence about dinosaurs, you need some actual molecules—a tall order for a group of animals that died out 65 million years ago. But in 2003, scientists Jack Horner and Mary Schweitzer discovered some unfossilized material inside a *T. rex* bone by a combination of luck, desperation, and sharp eyes. Faced with flying a giant femur (leg bone) out of a remote Montana field site, they broke the bone in half so it would fit inside their helicopter. If they'd had a larger helicopter, we might never have known.

(Source: *T. rex* Linked to Chickens: [smithsonianmag.com/science-nature/t-rex-linked-to-chickens-ostriches-180940877](http://smithsonianmag.com/science-nature/t-rex-linked-to-chickens-ostriches-180940877)). When these two scientists broke this bone in half, they discovered the tissue inside.



“Collagen is like the glue that holds your skin and muscles together.” Literally, the word comes from Greek, kolla, which means... get this... “glue!” (Source: Are Chickens Related to the *T. rex*? [dino-kidz.com/are-chickens-related-to-t-rex](http://dino-kidz.com/are-chickens-related-to-t-rex))

Unlike in *Jurassic Park*, the real-life researchers couldn't recover any DNA from the ancient remains. But they did retrieve molecules of collagen, a structural protein that appears in slightly different forms in many animals. They compared the dinosaur version with 21 living animals, including humans, chimps, mice, chickens, ostriches, alligators, and salmon. *T. rex*'s collagen proved to be most similar to chickens and ostriches; its next closest match was to alligators.

Chickens and ostriches are only distantly related to each other, so the research says little about what kind of birds might be the closest relatives of the famous carnivore. The scientists noted that answering that question would require data from more molecules than just collagen. Whether they are currently cracking into any more giant fossils in search of material was not divulged. (Source: *T. rex* Linked to Chickens: [smithsonianmag.com/science-nature/t-rex-linked-to-chickens-ostriches-180940877/](http://smithsonianmag.com/science-nature/t-rex-linked-to-chickens-ostriches-180940877/))

**Task:** Discuss the following: Why was finding collagen inside a dinosaur bone such a major discovery? What did the collagen evidence show? Are chickens very closely related to the *T. rex*, or is more information needed to make further conclusions? Explain your answer with evidence.