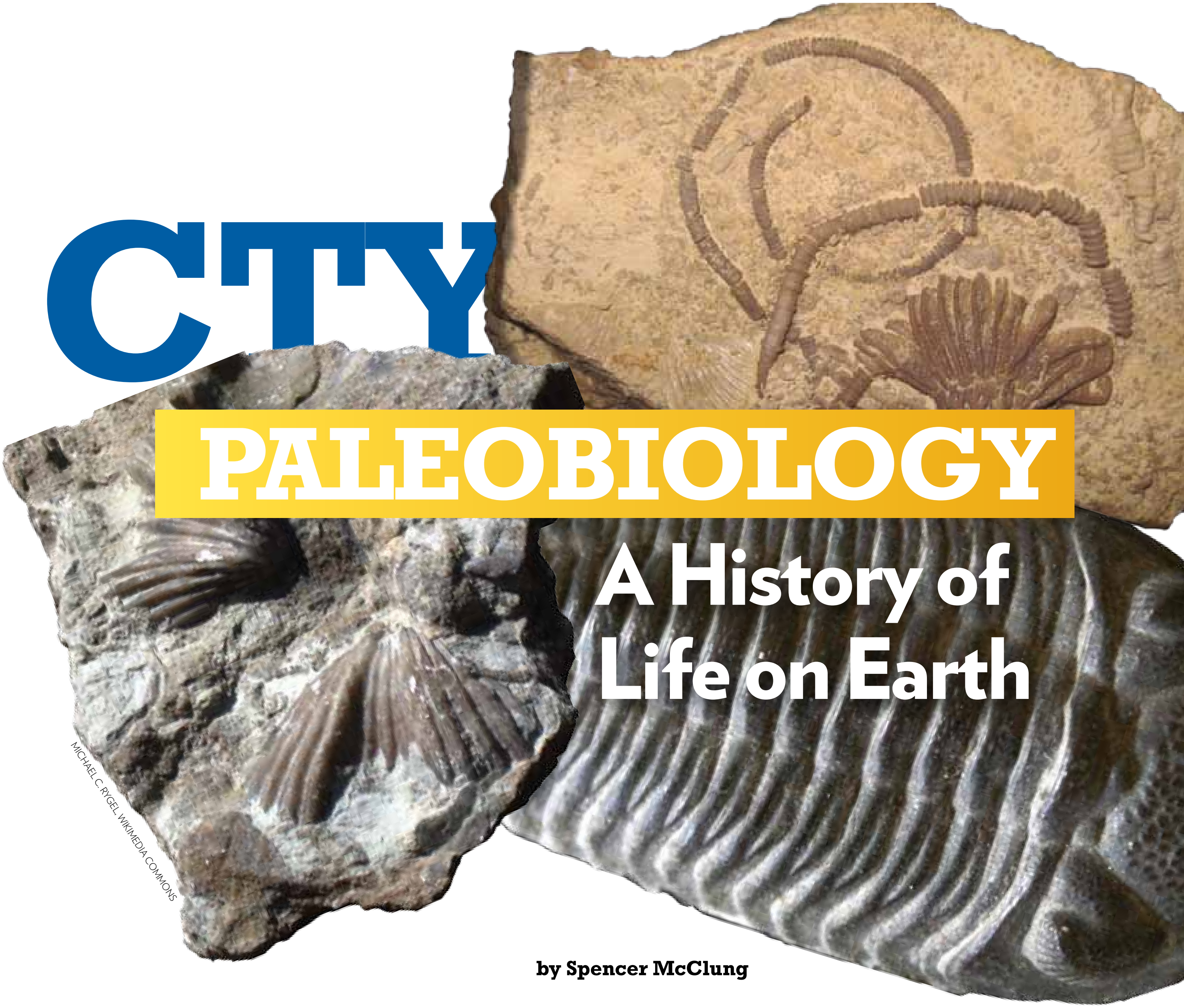
# CTY PALEOBIOLOGY

## A History of Life on Earth



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by Spencer McClung

Have you ever been hiking in the woods or hills and found a rock with strange grooves or bumps in it? Those shapes could be the fossilized remains of creatures that lived hundreds of millions of years ago. Even tiny dots or indents can be a fossil.

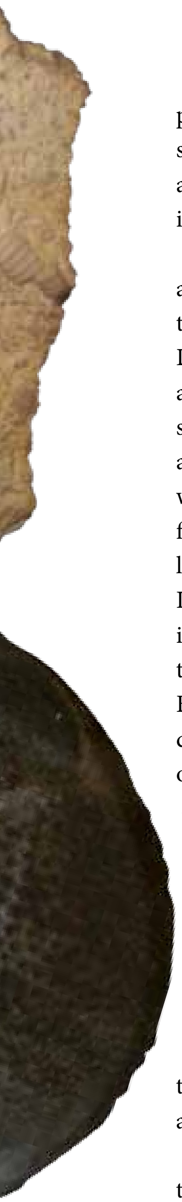
Although you will probably not find a *T. rex* in your garden, you can often find fossils in sedimentary rock, which is extremely common. Scientists can tell numerous things from a fossil, such as where and when the creature lived, what it ate, and how it died. I learned to do exactly this kind of analysis in the Paleobiology course I took at CTY last summer.

### A Paleozoic Menagerie

When I first signed up for this course, I thought we would learn about dinosaurs. I was surprised when we focused much more on early Paleozoic era creatures, but I soon found myself as intrigued by trilobites as I had been by pterodactyls.

For our first activity, we looked at a mould fossil of a group of brachiopods found in Europe. We learned that fossils are often found in groups because events like landslides or mudflows can preserve entire colonies of animals at one time. As we examined the mould, we could see that it contained a few different species; some had up to 10 rings on them while others had none, and they varied widely in size. Only about one percent of all creatures are fossilized, so these fossils represented only a tiny fraction of the animals living at that time and in that location. Seeing this moment in time immortalized was a great start to the course.

Almost every day, we did an activity that demonstrated a concept we were learning: Using different types of pliers to pick up seeds demonstrated the form and function of Darwin's finches' beaks, and leaving tracks on the sidewalk as we ran and walked in wet socks showed us how a dinosaur's speed affected the tracks it left in mud. One of my favorite activities took place on a field trip to a local fossil dig site, where we examined many different rocks and fossils, mainly from the Paleozoic era. At first, sitting on a hot, sunny hill looking at rocks didn't seem very fun, but before I knew it, I was completely focused on a small rock with something in it. I spent about 10 minutes trying to get a fossil out of the rock, and I was frustrated when I accidentally broke it. But fortunately there were many more fossils in the area to discover. I managed to find many crinoids, bivalves (ancestors of current-day clams and oysters), and even two trilobites—ancient marine arthropods that look like pillbugs—before we called it a day. We each left with a small sandwich bag containing the fossils we'd found.



### Exploring Evolution

The overarching concept we discussed in this course was evolution. Diagrams of evolutionary trees and paths showed us how life has changed from single-cell organisms to great white sharks and grizzly bears, but just as intriguing are the gaps in the trees where no fossils have been found.

A book we read for class, *Your Inner Fish* by Neil Shubin, tells the story of a group of paleontologists who found the first fossil of a fish with signs of arm and leg bones. This transitional animal, named Tiktaalik (and nicknamed a "fishapod") by its discoverers, filled in a major gap in the tree of life because it was the first evidence of a fish that walked on land. It was exciting to learn that it's still possible to make huge scientific discoveries like these.

In the lab, we explored evolution through the comparative dissection of a newt, a bird, and a mouse. On an evolutionary tree, we could see that these were all members of the phylum Chordata (like humans), but over millions of years, these species had adapted differently to environmental forces including temperature, predators, and available food. I found the comparison of their internal organs and structures especially interesting. The newt's liver was extremely large, suggesting that its diet was very diverse. The mouse had a very long intestine, a trait that allows it to get as many nutrients as possible from meals that may be far apart. The bird's very light body was necessary for flight, and its extremely tough pectoral muscles showed how much force was required to flap its wings.

### Reimagining Dinosaurs

In addition to ancient sea dwellers like bivalves and trilobites, we also discussed dinosaurs. This was why I had signed up for the course, so I was very excited—and very surprised by things I learned. Some dinosaurs may have been feathered, for example. And many dinosaurs I'd thought of as "fearsome predators" might actually have been herbivores, or, like the famed *T. rex*, scavengers that ate the remains of other dead dinos.

As we progressed in the dinosaur unit, I started thinking about the movie *Jurassic Park*—and how much of it was inaccurate. *T. rex* did not rely on sight as the movie portrayed, but depended mostly on smell, and I could rant for days about how badly fossil specimens were treated (No bags? The fossil site exposed to the environment?!). We even had a debate one day in class about why a real-life Jurassic Park would not work. Now maybe if we found a preserved, intact dinosaur fetus, it would be a different story, but DNA alone cannot recreate a dinosaur.

Learning a full college semester of content in three weeks was a lot of hard work, but it was worth it. I left with a more scientific understanding of the dinosaurs I'd hoped to study, but just as important, I came to appreciate the many forms life has taken in our planet's history.

**Spencer McClung** is in ninth grade at Glenelg Country School in Ellicott City, MD. His interests include cross country, track, robotics, band, chorus, and Boy Scouts. Spencer is the third CTYer in his family and has attended CTY for four summers.



**Learn more about CTY's Paleobiology course and other offerings at www.cty.jhu.edu/summer.**