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 repre-
sented only a tiny fraction of the animals living at that time
and in that location. Seeing this moment in time immortal-
ized 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 com-
parative 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 nutri-
ents 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 tri-
lobites, 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 inac-
curate. 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.

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