

fossil bed: an area of land that contains fossils

diverse: of different kinds, forms, or types

evolutionary line: the sequence of organisms that descend from one particular organism

evolutionary biologist: a scientist who studies the origins and evolution of living organisms

misinterpreting: understanding or explaining incorrectly

arthropods: the largest phylum in the Animal kingdom, it includes insects, spiders, and crustaceans

Trilobite fossils found at the Burgess Shale helped scientists date the other creatures found there to the Cambrian period, which lasted from 530 to 520 million years ago. This period in Earth's history saw a phenomenal increase in the diversity and abundance of Earth's life forms within a relatively short time.

Another of Stephen Jay Gould's debated hypotheses was that evolutionary change occurs in sudden bursts, followed by long periods of stability.

How does new knowledge change the way scientists look at old discoveries?

Around 1909, Charles Doolittle Walcott received a bit of interesting news. Canadian railroad workers were collecting “stone bugs” that they had found while cutting a path through the Rocky Mountains. Walcott was the head of the Smithsonian Institute, and a respected paleontologist, so he rushed to see what kinds of fossils had been found.

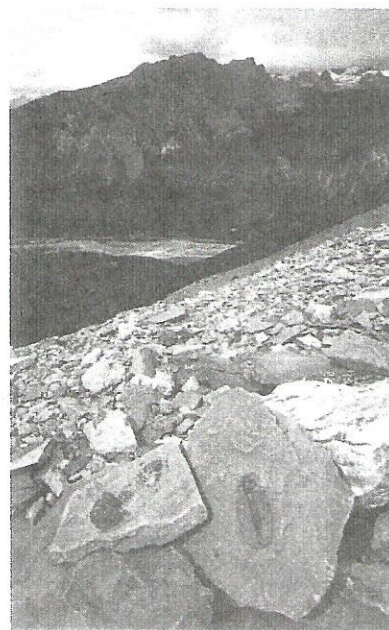
From 1910 to 1917, Walcott collected more than 65,000 specimens from the area—a massive fossil bed he named the *Burgess Shale*. After Walcott returned to Washington, D.C. with his fossils, he began the task of categorizing them. He didn't recognize many of the creatures, so he classified them as odd examples of organisms already known to have existed in Earth's prehistoric past. Eventually, the fossils ended up in drawers at the Smithsonian, and there they sat, mostly forgotten, for almost 50 years.

In the 1960s, Canadian scientists decided to take another look at the Burgess Shale. They discovered even more fossils, and a new study, led by Harry Whittington began. He traveled to D.C. and reexamined Walcott's forgotten fossils. Many years had passed since their discovery. A lot of new information was known about Earth's earliest life-forms and how they had evolved into the diverse organisms of today. Whittington and the other scientists were shocked to discover such a huge collection of creatures that looked like no other organisms they'd ever seen before.

Most fossils have an evolutionary line that can be traced to other creatures in the fossil record, or even to organisms that exist today. Many of the creatures in the Burgess Shale fossils, though, seemed to have appeared at just this one time in history. They didn't slowly evolve over time into other known organisms. Instead, something seemed to have happened that caused them to become extinct soon after this one appearance in the fossil record.

In his popular book, *Wonderful Life*, evolutionary biologist Stephen Jay Gould argued that this characteristic helped prove his idea that luck plays as much, if not more, of a role in evolution than natural selection does. Gould's book angered the scientists who were still studying the fossils. They felt that Gould was misinterpreting their data to support his hypothesis.

By the 1990s, paleontologists Derek Briggs and Richard Fortey had reclassified most of the unusual Burgess Shale organisms as arthropods. The fossilized creatures were ancient relatives of insects—not completely unique life forms that had never evolved.



Circle the letter of the best answer to each question below.

1. The creatures preserved in the Burgess Shale fossils are most closely related to modern
 - a. reptiles.
 - b. mammals.
 - c. fish.
 - d. insects.

2. The Cambrian period occurred
 - a. thousands of years ago.
 - b. a few million years ago.
 - c. hundreds of millions of years ago.
 - d. billions of years ago.

Write your answers on the lines below.

3. Further research into the Burgess Shale fossils showed that the data did not support Gould's hypothesis. Do you think this information proved that Gould was wrong? Why or why not?

4. Major museums such as the Smithsonian Institute have thousands, if not millions, of artifacts that are stored away, but not displayed. Based on what you read in this selection, why is it important for museums and other institutions to hold on to artifacts, even if they are no longer currently being studied?

5. The biggest criticisms of Gould's book didn't focus on his hypothesis; they focused on his methods. Why do you think scientists' methods of investigation need to be carefully examined by other scientists?

