

## **Cambrian Explosion Fact Sheet**

The Cambrian Explosion was a burst of animal evolution that occurred 540 million years ago. It's called an explosion because it happened in about 20 million years, a very short time on the geologic time scale.

There were multicellular animals already living before this time: early animals – sponges, cnidarians and flatworm ancestors – all appeared before the Cambrian. But during the Cambrian Explosion the basic body plans—the designs – of most of the animal phyla that have ever lived appeared within those mere twenty million years.

Almost all of the new body plans, 35 in all, were bilateral. During this evolutionary leap, came new active predators, changing the relationships among animals and creating new, more complex food webs.

Scientists have found fossil evidence of the Cambrian Explosion at sites around the world. The most famous is the Burgess Shale in British Columbia, Canada. Other sites include: Chengjiang, Yunnan Province, China; the House Range, near Delta, Utah; and near the Aldan River in Siberia, Russia.

In 2016, the causes of the Cambrian Explosion are still the topic of scientific debate. Scientists agree that there were probably both biological and non-biological causes interacting with each other. Some of the proposed causes are:

- Genetics: in the Cambrian, the genetic code reached sufficient proportions to command and control the production of not just simple animals, such as sponges and jellies, but the more complex phyla of creatures.
- Rise in oxygen levels: scientists are investigating whether or not oxygen levels rose significantly just before the Cambrian. Higher oxygen levels allow for more active predators.
- A rise in sea level: a rapid rise in sea level in the early Cambrian flooded land, triggering erosion and an increase in minerals like calcium (threefold increase over previous levels) and phosphorus in sea water. These minerals then became available to organisms to build hard structures.
- An evolutionary arms race: with bilateral active predators, prey evolved defenses leading to new adaptations and species.
- Burrowing animals opened new habitats that allowed more diversification of body forms.

### **Keywords and Concepts**

- Paleontologist: a scientist who studies forms of life as represented by fossils that existed in past geologic times.

- Fossil: the naturally preserved remains or traces of animals or plants that lived in the geological past.
- Genetic revolution: scientist hypothesize that the period prior to the Cambrian explosion saw the gradual evolution of a "genetic tool kit" of genes that govern developmental processes. Once this genetic tool kit was developed, a period of evolutionary experimentation caused a genetic revolution.
- Evolutionary arms race: as prey develop better and better defenses, predators are successfully evolving new and different ways around those defenses. It's a never-ending arms race that continues today.