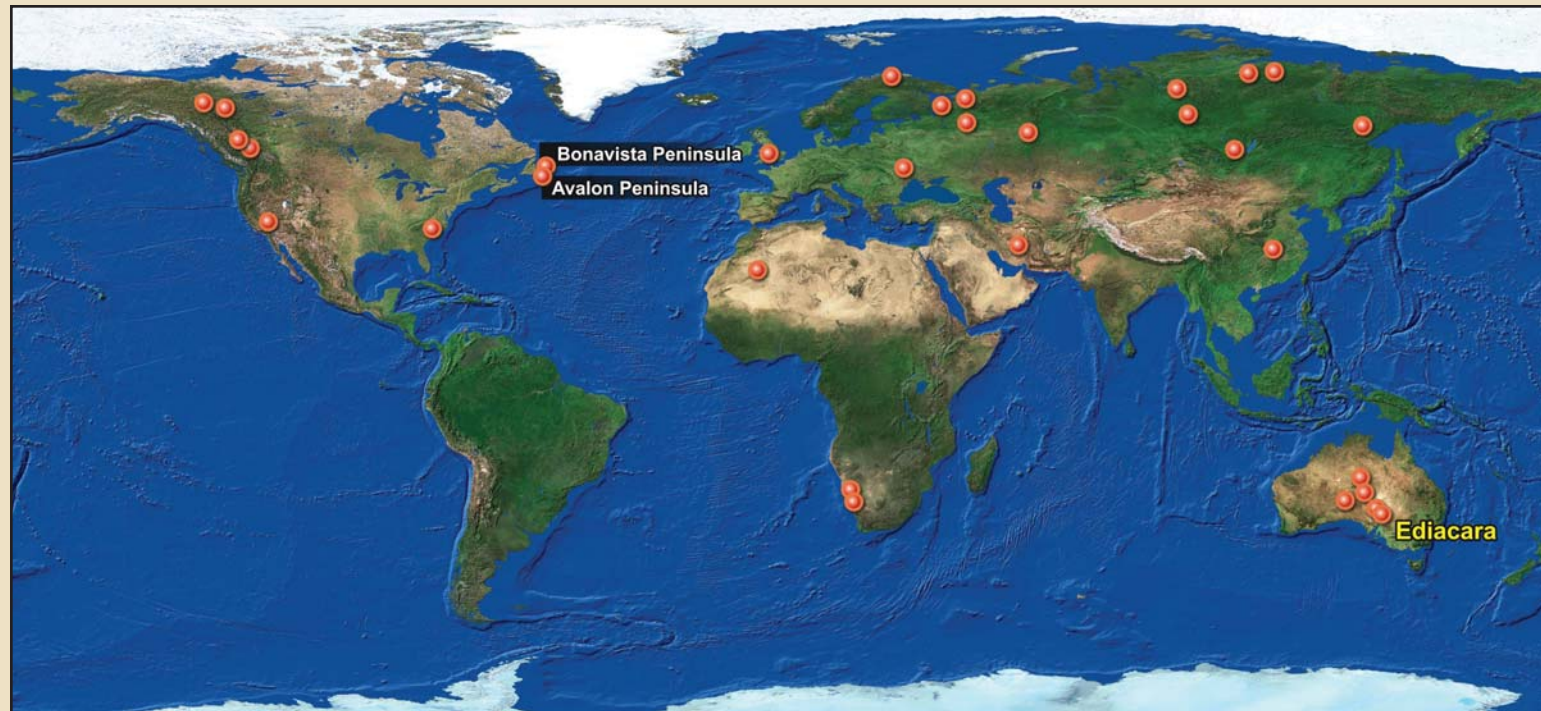


CREATURES OF THE EDIACARAN PERIOD



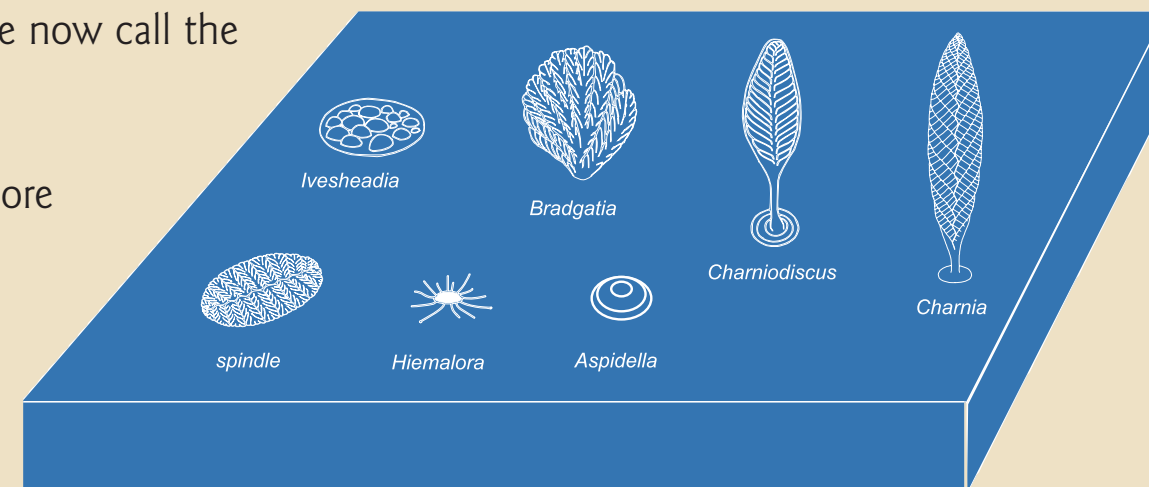
Ediacaran fossil locations around the world.

COASTAL ROCKS REVEAL THE ANCIENT PAST

In 2003, remarkable fossils were found in the Trinity Bay North – Little Catalina area. They were discovered by geologists from the Newfoundland and Labrador Geological Survey engaged in detailed geologic mapping of the Bonavista Peninsula. Similar fossils had previously been discovered by researchers on the Avalon Peninsula: at Mistaken Point in 1967 and, more recently, along the coast of western Conception Bay.

These Newfoundland sites are three of only about 30 comparable sites that are known worldwide. They include some of the most spectacularly well-preserved examples of Earth's early complex marine life forms, which lived in what we now call the Ediacaran Period.

Read on to discover more about these intriguing fossils, some of which are exposed just below this boardwalk.



Types of Ediacaran fossils that have been identified.

“HERE” WAS NOT ALWAYS HERE

Eastern Newfoundland, including the Bonavista Peninsula with its easily accessible rocky coastal cliffs, provides an excellent outdoor laboratory for the study of this important period of Earth's history. Its bedrock core was formed by geological processes that were active when this area lay near Africa.

More than 500 million years ago, this peninsula was part of the ancient continent Gondwana, and an ocean separated Newfoundland's present-day east and west coasts. The bedrock of the Bonavista Peninsula records the existence of volcanic mountain ranges, river plains, wide shallow seas, and deep ocean basins—all environments that are still found on Earth. These geological phenomena are the result of plate tectonics processes that still move continents today.

THE FOSSILS YOU CAN SEE...

The most prominent fossils exposed near this boardwalk are:

- bush-like or lettuce-like structures – *Bradgatia* (B)
- pizza-like forms – *Ivesheadia* (I)
- simple discs – *Aspidella* (A)
- discs with attached fronds – *Charniodiscus* (C)

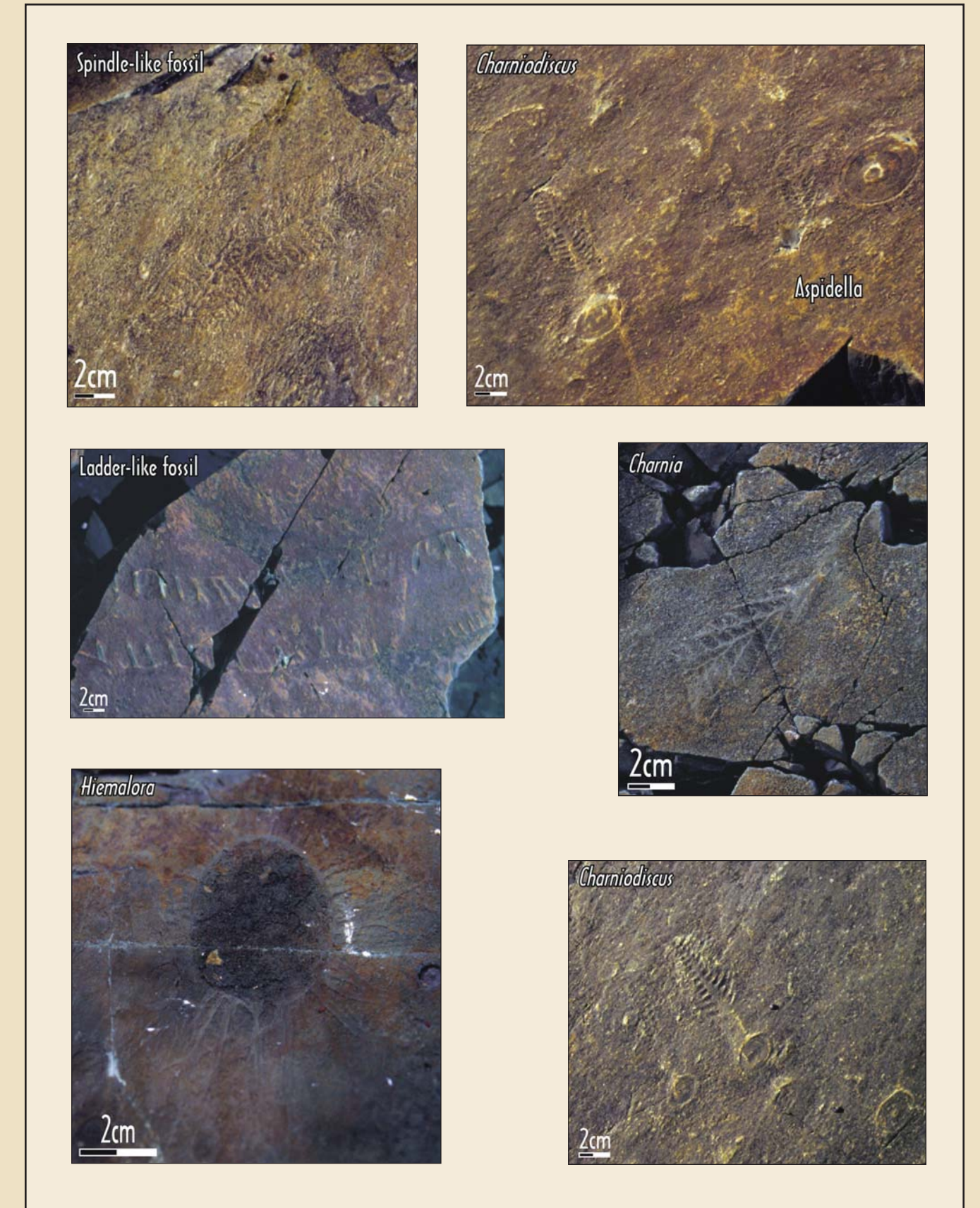
Aspidella, the impression of a bulb-shaped anchoring structure, was originally described in 1872 from rocks of the same age exposed in downtown St. John's. It was the first fossil from the Ediacaran rocks to receive a scientific name. In the illustration below, the letters represent the first letter in the name of each fossil.



These are some of the Ediacaran fossils located near this boardwalk.

HOW TO BEHAVE AROUND A FOSSIL

As are the related fossils in Mistaken Point Ecological Reserve (on the Avalon Peninsula), the fossils in this area are under provincial protection. It is an offence to collect or damage them. To avoid accidental harm, please do not walk on the fossils.



Other Ediacaran fossils on the Bonavista Peninsula.

...AND WHY THEY ARE IMPORTANT

These are amongst the earliest known large organisms with complex structure. They are very different from the mostly microscopic forms that lived prior to the Ediacaran Period, and the more complex and modern-looking forms in younger rocks.

Although some Ediacaran fossils resemble present-day marine organisms (for example sea pens), their affinities are still poorly known. Some are regarded as peculiar primitive animals (similar to sponges) with no obvious mouth or digestive tract. They may have obtained nutrients by filtering microscopic organic matter in the water column. Alternatively, they may have been part of a separate, extinct group that derived food from bacteria living on their bodies. Others may have grown like fungi. All of these organisms both developed *and* became extinct during the Ediacaran Period.

Text and graphics :

Hans Hofmann, McGill University

Sean O'Brien, Geological Survey of Newfoundland & Labrador, Dept. of Natural Resources

Arthur King, Memorial University of Newfoundland

Artwork (except where noted): Dave Leonard, Geological Survey of Newfoundland & Labrador, Dept. of Natural Resources

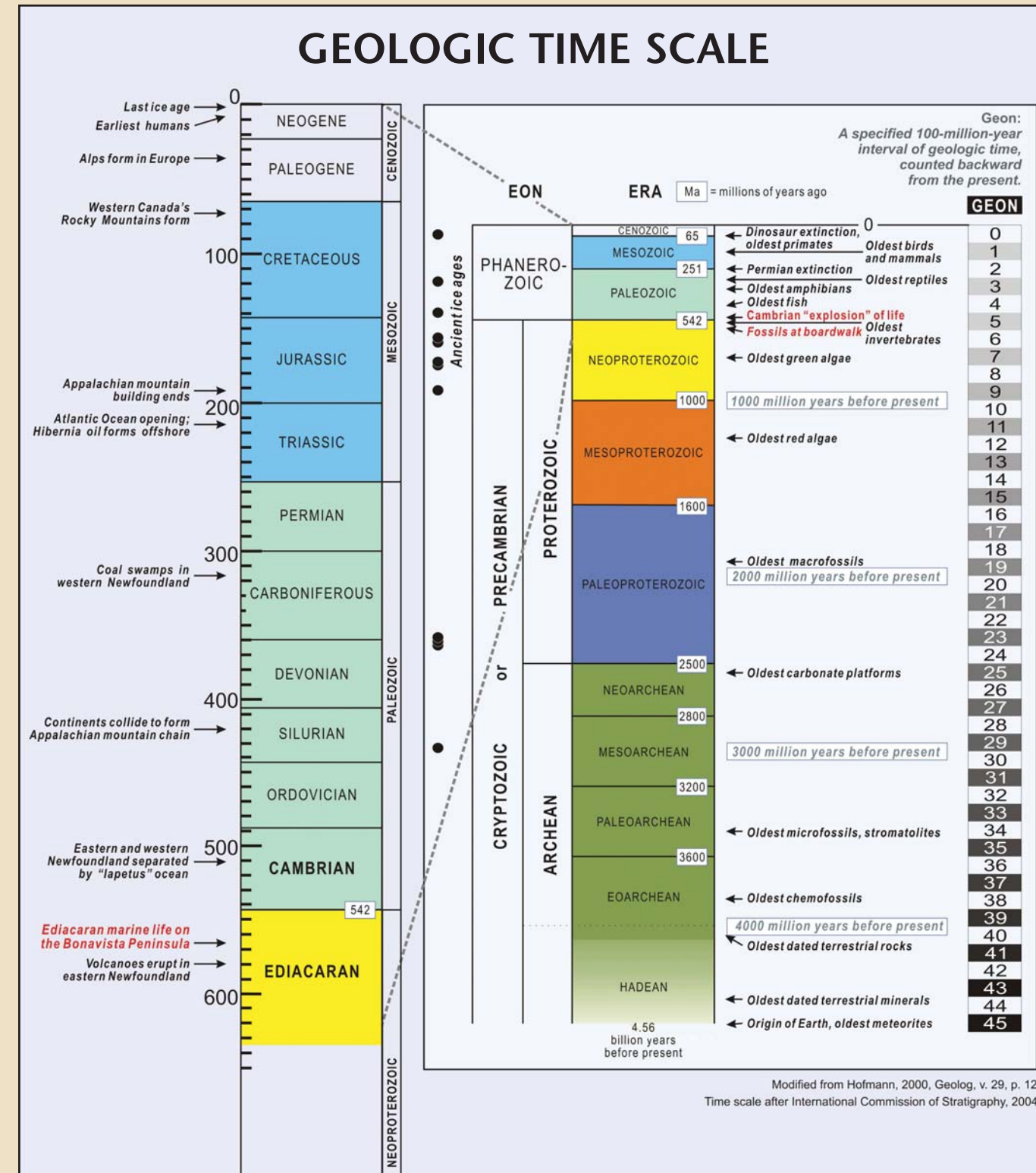
Layout and design: SGS Design Limited

LOOK INTO THE ANCIENT PAST

WHEN WAS THE EDIACARAN PERIOD?

Earth's 4.5-billion-year history is divided into eons, eras, and periods (as illustrated in the Geological Time Scale below). Periods vary in duration, and each is marked by its own distinctive life forms, events, and conditions.

The Ediacaran Period is a remarkable 90-million-year-long interval of Earth history that ended 542 million years ago. It was a time of fundamental changes in the Earth's climate, atmosphere, and oceans. It was during this period that the earliest complex organisms first populated the ancient seas.



Geologists use the age of rocks to help calibrate geologic time precisely. They do it by analyzing rock-forming minerals that contain radioactive elements. These elements decay at a known rate. By measuring their relative abundances, the mineral's age can be determined.

Where fossils are present, most notably in the latest Precambrian and Phanerozoic eons, they may also be used to determine the age of the rocks containing them. Importantly, fossils also reveal information about the once-living organisms and their environment.

HOW DEEP-SEA CREATURES BECAME FOSSILS

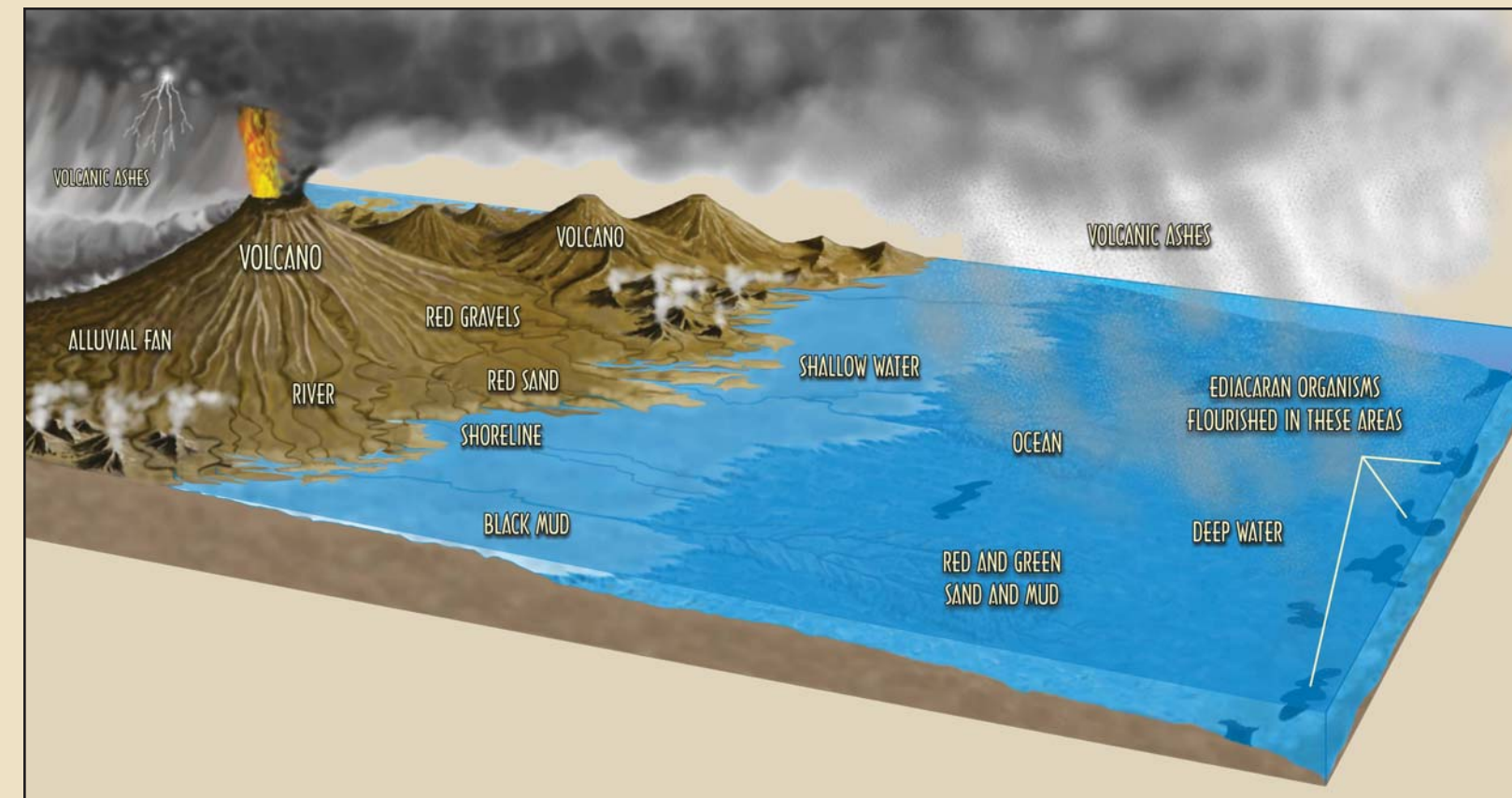
The rock surfaces below this boardwalk preserve the remains of odd-looking creatures that lived about 570 million years ago. They lived on an offshore muddy sea bottom, so far below the surface that no light could penetrate. From time to time, earthquakes stirred up the sediment on the sea floor, and caused it to flow downslope into even deeper water, where it accumulated in layers or beds. The currents dropped their suspended load of silt and sand along the way, which flattened and buried any organisms in their path. The creatures you see today as fossils had neither shells nor bones, so only the impressions of their soft parts are left in the layers of old sediment.

Frequently, ash from eruptions of ancient volcanoes nearby also settled out in the seawater. They buried these bottom dwellers in place, preserving much detail, just as the Vesuvius eruptions buried Pompeii. You can see the remains of the ash in the thin rusty layer immediately above the fossils.

Eventually, hundreds of metres of sediment and ash accumulated in layers. Much later, they hardened into shale, siltstone, and sandstone bedrock.

In places, the ashes also contain grains of the mineral zircon, which holds minute amounts of uranium and its decay product, lead. Together, these elements allow the zircon crystals that formed at eruption time to be dated in a specialized laboratory. The fossil layers are about 570 million years old. These beds were once horizontal but were later tilted into their present position by faulting and folding, at which time the circular or disc-like holdfast impressions were deformed into ellipses.

Much of this tectonic activity happened more than 450 million years ago, when parts of the ancient continent of Gondwana (including present-day Europe and Africa) collided with ancient North America, forming the Appalachian Mountain chain.



Over time, the gravels consolidated into conglomerate, the sands to sandstone, the muds to mudstone or shale, and the volcanic ash to volcanic rocks known as tuffs.



Diorama of composite Ediacaran biota: National Museum of Natural History, Washington, DC.

WHAT THE FOSSILS TELL US

The fossils near by provide us with a glimpse of what members of a community of extinct Ediacaran life forms looked like. They existed before the more familiar-looking, hard-bodied, skeletal Cambrian-aged animals appeared on Earth. These fossil beds also allow us to compare the rocks, fossils, and ancient environments of the Bonavista Peninsula with locations around the world that also have Ediacaran fossil assemblages. In particular, the fossils you see here have a strong resemblance to fossils on the Avalon Peninsula, as well as in the Charnwood Forest area in England, where several of these fossil forms were first found.

Continued study of these mysterious fossils will help us learn more about the affinities of these life forms, the reasons for their success, and their eventual extinction 542 million years ago.

HOW TO BEHAVE AROUND A FOSSIL

As are the related fossils in Mistaken Point Ecological Reserve (on the Avalon Peninsula), the fossils in this area are under provincial protection. It is an offence to collect or damage them. To avoid accidental harm, please do not walk on the fossils.



For a brochure about the Ediacaran fossils found in Port Union, please contact:
The Sir William Coaker Heritage Foundation
www.historicportunion.ca
Tel: 709 469-2207

Text and graphics (other than diorama): Hans Hofmann, McGill University; Sean O'Brien, Geological Survey of Newfoundland & Labrador, Dept. of Natural Resources; Arthur King, Memorial University of Newfoundland.
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