

Types of Fossils

Some fossils are readily visible in the rock, while others can only be found after a careful search. Most fossils can easily be found by splitting open rocks lying on the beach. The drawings will help you identify the different types of fossil animals that once lived here.

Collecting fossils from the bedrock exposures (cliff face) is prohibited without a Heritage Research Permit.

All fossils are protected under the Special Places Protection Act with the Nova Scotia Museum designated as caretaker. Please call the Museum if you see an unusual fossil (not shown in this flyer) at 902-424-6451.

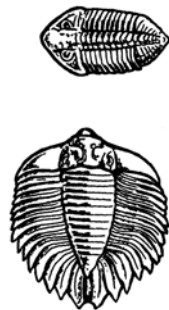
Brachiopods (lamp shells) are the most common fossils at Arisaig. Like clams, they have two shells but the shells are not the same shape. There have been brachiopods in Earth's oceans for more than 400 million years, once there were hundreds of species, today only a few species remain.



Snails from the Silurian sea look generally like modern snails, but some are quite strange. One form had a coiled shell that flared very wide at the bottom, perhaps an adaptation to walking on soft mud. At Arisaig, the best snails are found in the limestones.

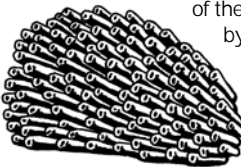


Clams and other bivalves are familiar creatures. The two shell halves are just about identical - this is how you distinguish them from brachiopods. In the Silurian sea, clams were not nearly as common as brachiopods.



Trilobites are an extinct group of arthropods. Modern arthropods such as insects and crabs have hard outside skeletons and jointed legs. Trilobites are so named because of their three lobes. They had large compound eyes like modern insects and walked on the sea floor. Usually only broken pieces of trilobites are found at Arisaig, but watch for whole ones or head sections.

Bryozoans, or moss animals, lived as colonies of individuals in a hard, shell-like skeleton. At Arisaig, there are branching, stick-like forms (stony bryozoans) and also encrusting forms (lacy bryozoans). The surface of the bryozoan is covered by tiny pits that once contained the individual soft-bodied creatures. These pits are a good clue for identifying a bryozoan fossil. Bryozoans still live today.



Sea lilies, or crinoids, are not plants at all. They are filter-feeding animals that lived attached to the sea bottom by a thin stalk. Several kinds of crinoids still live today. At the top of the stem, a plate-covered body with ten or more feathery tentacles collected food. Whole crinoids are not often fossilized, because unless they were buried quickly and gently by sediments soon after death, the plates come apart and scattered. You will probably find sections of stems- they look like stacks of small coins.



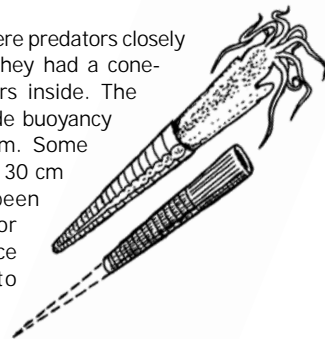
Tentaculites and **cornulites** are common. We are not exactly sure what sorts of creatures produced these small cone-shaped fossil shells with rings.



Graptolites are extinct also, and nothing exactly like them lives today. Imagine a colony of creatures living in small chambers along something looking like a tiny hacksaw blade. Gas-filled floats supported the colony. Graptolites had no hard body parts; the long thin colonies are preserved as a shiny black carbon film on the rock.

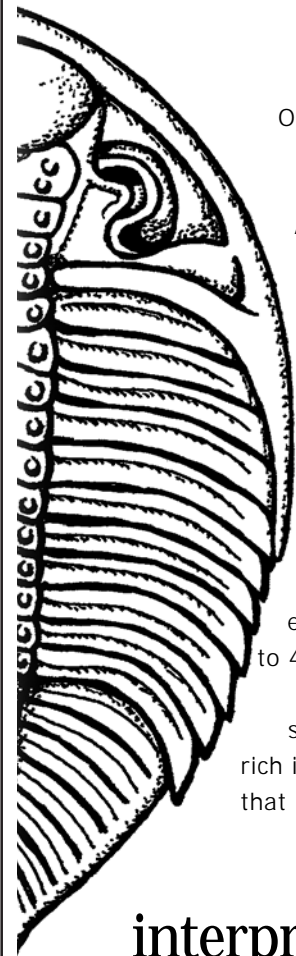


Nautiloids or horn shells were predators closely related to modern squid. They had a cone-shaped shell with chambers inside. The chambers held air to provide buoyancy so the nautiloid could swim. Some large nautiloid shells, up to 30 cm (12 inches) long, have been found at Arisaig. Look for tapered shells with evidence of internal chambers to identify them.




ARISAIG

Provincial Park




One of the world's best exposures of Silurian bedrock sections (the Arisaig Group) can be seen along the Northumberland Shore, from Arisaig Point to McAras Brook. The five kilometre sedimentary exposure provides an important insight into the ancient environment from 443 to 417 million years ago. Sections of these sedimentary rocks are rich in fossils and features that have aided geologists in...

interpreting an ancient environment.



NOVA SCOTIA
Natural Resources

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Landforms

Landforms in and near the park show some fascinating parts of the geological history of this area. When you walk the coastal trail, stop at some of the overlooks. As you look northeast along the coast toward Arisaig Point you will see the coastal cliffs of mudstone. Look carefully at the top of these cliffs and you will see a relatively flat top covered by deposits of gravel. Careful mapping by geologists has shown that these flat surfaces are wave-cut benches eroded by the sea 130,000 years ago. The gravel deposits are beach gravels. If you look down at the water level, you will see wave-cut benches being eroded into the mudstones now with accompanying beach gravels.

From the picnic areas within the park the Antigonish Highlands are visible to the southeast. The tops of these hills are flat and represent a time when rivers had eroded the land down to a relatively flat surface.

Later the land was uplifted along the Hollow Fault and the hard Precambrian rock preserved the flat surface from significant erosion but the relatively weak and soft younger rocks were deeply dissected by streams.



The flat surface of erosion on top of these highlands, and other highland areas in the province, probably represents processes that began more than 40 million years ago.

Underlying Bedrock

Precambrian, Ordovician and Silurian rocks are all located in or adjacent to the park. Precambrian rocks of the Georgeville Group are exposed on the high, flat-topped hills southeast of the park. They are separated from the younger rocks by the Hollow Fault, (an east-west running fault about 2 km south of the park). The 460 million year old Ordovician volcanic rocks at Arisaig Point are not part of the Silurian-aged Arisaig Group that appear in the park. An angular unconformity separates the two rock units. Dark grey mudstone, which originated as mud and silt on the ancient sea floor and was compacted into rock by the weight of layers above, is continuously exposed along the park's coast. These rocks are part of the Early Silurian Ross Brook Formation and indicate some significant changes in the ancient sea floor environment. Some of the thinner layers of coarse-grained mudrock have flat bottoms and undulating tops. These are large scale ripple marks called 'sand waves' that were formed by storm waves feeling bottom on a shallow continental shelf.

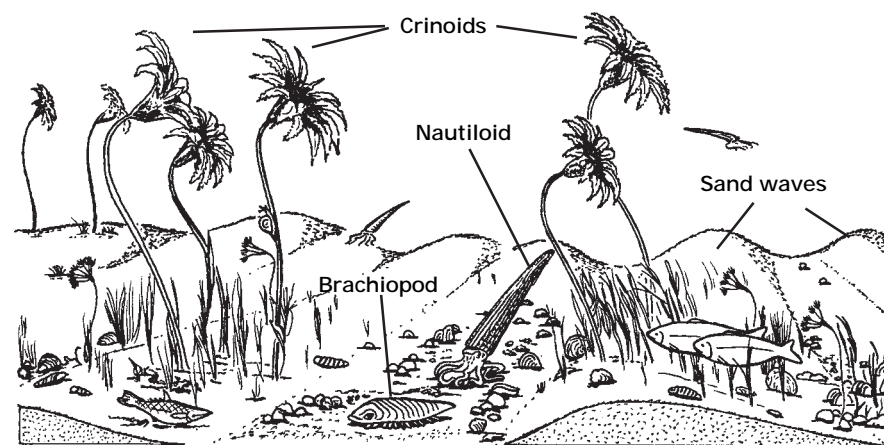


Glaciation

During the past glacial episode (75,000 to 10,000 years ago) the landscape has been altered by two processes: glacial deposition and glacial erosion. As the huge, one-to-two kilometre thick ice sheet moved over this region, it eroded the land by plucking blocks of rock from the bedrock and incorporating debris into the bottom of the glacier. Later, as the ice sheet melted and retreated, rock, sand and mud released by the melting glacier covered the ground (till) or formed small oval hills (drumlins) that cover the bedrock you see exposed along the shore.

Interpreting an Ancient Environment

The combination of sedimentary structures such as the 'sand waves' and the fossils, suggest an ecosystem of open continental shelf susceptible to periodic storms. However, not all of the rocks in the park support this interpretation. The dark grey mudstones at the northeastern end of the park have no evidence of life as shown by trace fossils or fossils with hard parts. Geologists have interpreted these mudstones as deposits formed when this part of the ocean was not receiving a circulation of oxygenated water and/or the ancient environment was in a local basin with a stratified water column. Gradually the environment changed to an open continental shelf rich in food bearing, oxygenated water. The transition between these two environments begins with the rocks at the truss bridge. Gradually the trace fossils become abundant, followed by the appearance of 'sand waves' and fossils with hard parts, which are all part of the 'sand wave' ecosystem.



Interpreting Fossils

Many of the animals at Arisaig either lived anchored to the sea floor or buried in the mud and silt below. Some, such as trilobites and snails, crawled on the sea floor to scavenge food, while others (nautiloids) swam as predators. Most of the animals that lived on or in the sea floor filtered the water to feed on microscopic plants and animals. Currents, tides, and storms were needed to move the food to animals such as brachiopods, corals, bryozoans and clams. By burrowing into the sea floor, clams and worms greatly disturbed the thin, straight layers of sediment (bioturbation). The absence of fossils and bioturbation indicates conditions were not suitable for life at these times. Most of the rocks at Arisaig are rich in fossils indicating an abundance of food, oxygen and sunlight.

The illustration (abridged from the Nova Scotia Museum of Natural History) shows an interpretive reconstruction of this environment.

Fossils

The rocks of Arisaig Provincial Park are abundant in fossils, but they are not distributed evenly through the rock section. At the northeastern end of the park the dark grey to black mudrock has no fossils. From the truss bridge on the coastal trail, to the southwestern boundary of the park at Arisaig Brook, the number

