Through fire and ice

a story about the rocks of Åland Islands

Welcome to The Åland Hunting- and Fishingmuseums Geotrail!

The trail begins with the info-sign where the most important events in the history of the Åland bedrock are described.

The walk is about 380 m long and ends out on the cape where another info-sign shows what you can see in the red cliffs.

Along the trail you will find boulders with some of the different rock types you can find on Åland.

In order to give you some perspective on the geological timescale the walk begins here at the sign at 2000 million years ago. When you get to the second sign you have reached today and you will also get a peek into the future.

If you want to begin your journey at the time for the creation of the earth, please go 500 m backwards.

Enjoy the nature and the beautiful surroundings but remember that the cliffs might be slippery.

1. Planet Earth formed about 4600 million years ago from remainings of the cloud of gasses and particles that created the sun. The oldest rocks found on Earth are 4000 million years old and are found in Canada.

2. Planet Earth can be compared with a peach. The inner core is solid iron with some nickel. The outer core is liquid iron and nickel. The mantle consists of partly molten rocks. Slow movements in the mantle make the outermost layer, the crust, moves. The crust is as thin as the skin of the peach.

3. The position of the Nordic countries in the sign tells you where Åland has been at different times. At times Åland has been at the equator on other times on its way to the Antarctic.

4. The oldest rocks in Finland are 3500 million years old and can be found in Siurua in northern Finland. The oldest rocks in Sweden are 2800 million years old and are found in northern Norrbotten.

5. 1900 million years ago two plates of the crust collided, one part of the crust sunk and melted. The molten magma rose to the surface and created volcanoes, just like in Japan today. Remains of these rocks that are Ålands oldest, can be found in the eastern parts of the Åland archipelago.

6. The collision continued and 1850 million years ago it was so forceful that the volcanoes and other rocks that had been created were wrinkled to form a mountain range high as the Himalayas. The deepest parts of the mountain range were heated up and became molten again.

7. After a quiet period, new magma poured up 1570 million years ago. It is now the typical red rapakivi of Åland is formed. Black diabase is also formed at this time.

8. The mountain ranges are worn down by water, ice and wind. From this the Jotnic sandstone that can be found on the shores of Åland is formed. Sometimes you can see ripple marks that tells you that they were formed on a sandy beach.

9. 1000 million years ago a meteorite hit Åland. A large crater formed where the bay of Lumparn is today.

10. In the warm sea in the crater caused by the meteorite, animals like trilobites and different shells lived and coral reefs were formed. You can find fossils after these prehistoric animals in the 450 million years old limestone.

11. The dinosaurs lived 230 – 65 million years ago. There are no rocks of this age on Åland so we do not know if they lived here.

12. Åland was totally covered with ice during the last ice age 75.000 to 11.000 years ago. As the ice slowly advanced southwards it polished the rocks as giant sandpaper and created the smoothly rounded cliffs we see today.

13. As the thick ice pressed down the earths crust Åland was under the sea level when the ice melted. For more than 7.000 years ago Ålands highest hill, Orrdalsklint 129 m high, rose up above the sea. Åland is still rising from the sea at a level of 5 mm per year.

Welcome (sign 2)

You have now reached the present time.
By finding the red and blue numbers shown on the sign and on the cliffs, you will see some features that tell you about the rocks history.

First some words about the rocks on the cape;
The whole cape consists of a 1570 million years old rapakivi. Rapakivi is Finnish and means ”weathered rock”. Rapakivi is along with ”sauna” and ”sisu” one of the Finnish words that are used in all languages.
Rapakivi is a rock type that was formed down in the earth’s crust from a thick molten magma. The magma became solid rock before it reached the surface.

The scientific definition of rapakivi is: ”Rapakivi granites are A-type granites characterized by the presence, at least in the larger batholiths, of granite varieties showing the rapakivi texture. The typical rapakivi texture has large rounded feldspar grains, sometimes with a rim of plagioclase. Look at the boulders marked with ”Viborgit” and ”Pyterlit” along the trail.

There are different varieties depending upon differences in the appearance; viborgite, pyterlite, quartz porphyry, feldspar porphyry, aplite, equigranular rapakivi.

The main minerals in rapakivi are; kalifeldspar, plagioclase, quartz, biotite and hornblende. The kalifeldspar gives rapakivi the red color.
The variety on this cape is equigranular rapakivi but there are also some thin aplite veins.

1. Fragments. When the rapakivi magma rose up through the crust it tore fragments from the surrounding rocks. Here you can see a fragment that has floated in the magma and almost melted by the heat.

2. Aplite. At a later stage when the magma had chilled to rock it broke up again and new magma poured in. The surrounding rock was colder and rapidly chilled the magma that froze as fine grained aplite dikes. The aplites consist of the same minerals as the rapakivi.

3. Quartz veins. In the last stage of a magma intrusion fluids with silica often circulate. From these fluids veins with quarts are formed.

4. Hot water. When the rock fractures water often pour through. Sometimes the water is so hot and has a chemistry that transforms the surrounding rock. Here red feldspar formed around the old fractures.

5. Fault. When the rock fractures and moves earthquakes occur, and this can cause tsunamis.

6. Roche moutonnée. When the ice spread from the north it polished the rock as giant sandpaper. The northern sides of the cliffs are round and smooth whereas the southern side is fractured and broken.

7. Glacial striation. Stones frozen to the ice scraped the cliffs and left scars in the direction of the ice movement.

8. Chatter marks. When the ice pressed stones against the rock with great force, chatter marks were created.

9. Erratic boulder. When the ice melted the stones frozen into the ice were released. The stones were sometimes transported long distances. Sometimes you can see that the boulder looks different than the surrounding rock and that way you might know where it comes from.

10. Age determination. It is difficult to determine the age of a rock without sophisticated chemical assays. You can however often say which rock is older compared to another in the same outcrop. Here the rapakivi has been cut by a younger aplite which in turn is cut by an even younger pale colored quartz vein.

11. Volcanoes. Are there volcanoes in Eckerö? No, but there used to be. 8 km to the south on an island called Blåklobb you can find rocks that were formed from volcanic eruptions with glowing clouds of ash at the same time as the rocks on this cape were formed, 1570 million years ago,

The future

In 5000 years Åland has risen another 25 m above the sea and you can almost get to Finland and Sweden without using a boat.

All in all Åland will rise another 90 m from the sea. In 60.000 years Åland will be covered by a thick layer of ice.
In 250 million years Åland will still be almost as far north as today, but Åland will be Finland’s northernmost point!