

The roots of a Himalayan-sized mountain range in western Sweden

If humankind existed one thousand million years ago, they would have experienced a world very different from the one we know today. All the continents were gathered together as one big mass, and in western Sweden, they would have witnessed a large mountain chain the size of the Himalayas. These mountains were formed as continents collided with tremendous force. Deep underneath the ground, the roots of these mountains were being changed and deformed by the high temperatures and pressures that are caused by this type of collision. Geologists call the process that changed these rocks metamorphism.

We fast forward one billion years and end up in the year 2019. The gigantic mountain range has eroded away due to wind and water, and only the roots of these old mountains are now visible. One of the rock bodies that was metamorphosed when the continents collided is today found at the surface near Lilla Edet, north of Gothenburg. Scientists have long been intrigued by how these mountains formed, and this particular rock will give us one more puzzle piece to help solve the mystery. By looking through a microscope, we are able to study the building blocks of the rock itself, the minerals. The rock seen by Lilla Edet is called a garnet amphibolite, because of its two main building blocks; black minerals called amphiboles as well as large, red crystals known as garnets. The garnets themselves tell us about the environment in which the rock formed; this mineral only forms under immense temperatures and pressures. Exactly how immense, can be found out by examining the chemical composition of these garnets and the minerals surrounding them. The results are staggering; when this enormous mountain range existed, this rock was buried over thirty kilometers deep with temperatures reaching 700°C. This means, that the mountain range once found in western Sweden had roots deeper than thirty kilometers and one can only imagine what must have happened for these rocks to now be visible here at the surface.



By looking at this seemingly ordinary rock (left), scientists can study the roots of the immense mountains found around Gothenburg 1000 million years ago - a mountain range very similar to the Himalayas (right).
Photo credits: Anna Sartell (left); Eguchi Naohiro, Shutterstock, Photo ID 247185031 (right).

If humankind existed one thousand million years ago and they walked in the mountains of western Sweden, they would mostly likely have no idea of the immensity of what was happening beneath their feet. Thirty kilometers down, our garnet amphibolite was forming under unfathomable temperatures and pressures. They wouldn't have guessed that one billion years later, a curious geologist would study those rocks which were forming so many kilometers below them.