The Geology of Longyearbyen

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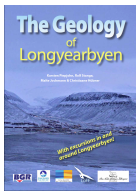
Longyearbyen feltbiologiske forening (LoFF), P.O.Box 694, 9171 Longyearbyen, 2012. ISBN 978-82-93009-05-4 (printed), ISBN 978-82-93009-06-1 (pdf), paperback, 36 pages.



The booklet informs reader about incredible geological history of Longyearbyen, the capital of Svalbard, and naturally of this whole autonomous territory of Norway between the Arctic Ocean in the north, and the Barents Sea in the south.

The publication starts with the stratigraphic chart that is compared with important geological events in Svalbard, its positions during geological periods on the Earth´s surface and global climate changes. Svalbard is unique because of evidence of two ice ages (Varangian and Marinoan) already in the Upper Proterozoic when it was situated in the vicinity of South Pole. In the Cambrian Svalbard was covered by a tropical shallow sea and drifted northward to the Equator which it crossed at the beginning of the Devonian. At that time, a huge desert dominated the Svalbard landscape to be changed by the oldest forest on the Earth by the end of the Devonian. Huge rain forests of the Lower Carboniferous age turned later into coal deposits. Than a warm shallow sea covered the area until the end of the Permian. During the Triassic and Jurassic, Svalbard travelled continuously northward, still under a shallow sea, but colder than in the Carboniferous and Permian.

The oldest rocks cropping out in the surroundings of Longyearbyen originated in the Early Cretaceous. They are represented by marine mudstones to siltstones with characteristic spherical concretions ("geodes") having inside remnants of bivalve shells or ammonites. Beside marine deposits, sandstones and mudstones of fluvial and deltaic origin with abundant plain relics and dinosaur footprints occur as well. No sedimentary rocks of the Late Cretaceous age are preserved and Lower Tertiary mudstones with high organic content including coal seams were deposited just on the Early Cretaceous rocks. The footprints of *Thulitheripus svalbardii*, a large mammal from the group of pantodonts and resembling the present hippopotamus, were found by two coal miners in the Lower Tertiary deposits. This finding gives evidence about dry land connection between North America and Svalbard in the Lower Tertiary. Opening of the Baffin Bay in that time caused collision between Greenland and Svalbard and origin of the so-called West Spitsbergen Fold and Thrust Belt.

During the Quaternary, Svalbard was repeatedly covered by huge ice sheets. The more than 1000 m thick glacier pressed the Earth´s crust down by about 200 m. After melting of the glacier, the crust started to return to its original position and it resulted in retreating shorelines – for example near Longyearbyen the highest traces of former coastlines are 60-70 m above sea level and date back 10,000 – 11,000 years.

The final part of the booklet proposes three various geological excursions: the first one shows geological phenomena just in Longyearbyen and its vicinity, in the frame of the second excursion we can visit the Trollstein ridge and the third one goes to about 10 km far Adventdalen where the coal Mine 7 is still active and the famous footprints of *Thulitheripus svalbardii* were discovered.

This nice publication with many instructive maps, photos and pictures can be recommended to everybody interested in geology.

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