

THE CAVES

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By caves we mean a natural underground cavity where the surrounding rock mass is solid mountain. We divide caves into a number of subtypes depending on how they are formed and what kinds of rocks they are formed from.¹

Hi – regarding our last tel. conversation, I’m just confirming that I’ll pick you up at your address at 12:00 on Saturday the 10th of January. The best type of clothing for the trip is overalls and thermal underwear ...Bring dry shoes and socks to change into after the trip. I’ll bring a helmet and a lantern. Take some snacks and something warm to drink. Regards, Iain.²

There is a layer of fresh snow, but the forest road has been ploughed so we manage to get through to the car park³. We put our overalls on and bring the bags of equipment. Normally, we would have gone on skis, but as the snow is hard packed, we can walk without sinking too deep. It is not that far, just under a fifteen-minute walk. I follow Iain. We chat as we walk. He then stops and says that we have arrived. I look around, but I do not see anything special and ask what he is looking for. Iain points down at the snow lying on the mountainside. A small stream that has not yet completely frozen runs under the snow; it is covered only by a thin layer of ice.⁴ The water disappears into a crack in the rock; the

sound of the rippling water is amplified by echoes. There is too much water, so we have to find another entrance. He opens the bag to get out the helmets and the lantern.

We find another entrance to the cave and enter. There has been a lot of rain lately, and the high water level and the strong current in the cave means that we do not get very far. It would be possible to go further if we swam, but we decide not to. I could tell that Iain would like to continue further into the cave, but I am happy that we have got this far. It is the relief patterns on the walls that interest me. As we stand with the water up over our knees and almost have to shout at each other because of the noise of the water, Iain tells me about the processes that lie behind the forms. With the lantern, Iain shines the light in different directions and explains how the water flow is eating into the soluble limestone, and that current ripples and scallops are different in size and look depending on the water's speed, turbulence, the directions of the current and the rock's porosity.

Speleologist⁵ Stein-Erik Lauritzen writes:

Cave science and cave sport are closely linked. Without field work – cave climbing – cave science is an impossibility, and much of the pioneering work in exploration is done by amateurs. [...] The Englishman Coleman noted in the late 1949s that it was more painful for the kneecaps to crawl with the flow than against it in the stream passages that had scallops on the floor. The reason was that the sharpest edges pointed downstream. [...] He also came up with

the so-called light test. If one shines a flashlight along the wall, the shadows in the scallops will be sharper when one shines the light in the direction of the flow of the stream than when one shines the light against it.⁶

I look at my incoherent notes from the expedition:

... of the water flowing ... marble/ limestone exposed to volcanic crystallization during land uplift ... 1000–2000 degrees, filled, burnt clay, sedimentary seabed, dead sea creatures, shells, fish scales and other such things... Climatic conditions. Stream deposits. Slate. Pacific Islands, Mediterranean. Stalagmites, stalactites that cover the floor, drip rate. Warm land high temperature + growth. Residual lime grows upwards, column formation ... Salt Greek island, Meharrad: an Arabian cave... the Dead Sea right by the road. Salt cave, Jerusalem - rainfall, cloudburst. Desert. Salt Caves. Land slip...not for tourists ... The case of the water tunnel that broke through into natural caves, white-clad people who helped to show water resources. Co2, high concentration due to volcano ...

In the car, after we get back from the cave, we change out of the wet, almost frozen clothes into a dry set of clothes. The car windows fog up. It is good to be warmed by the heat of the car radiator while we eat the packed lunch and drink warm coffee from plastic cups. Now I have seen a limestone cave from within and know more about the «method» of how

a cave such as this one gets its form and how it continues to change form.

¹ Caves are divided primarily into karst caves and non-karst caves. Karst caves are formed when the rock mass is dissolved by groundwater that flows through and «eats» into rock types that are highly soluble in water (limestone or dolomite). Thus, complicated duct systems are formed over several kilometres in length which can be straight, branched like the course of a river, or labyrinthine. Non-karst caves are caves formed by cracks in rocks that are insoluble. A gap is, in the geological sense, an open crack, and cleft caves can be subdivided further according to how the fractures have arisen or expanded. For example, ravine caves, solution weathering caves, sea/littoral caves, lava caves, druse caves and glacial caves.

Lauritsen, Stein-Erik (2010). *GROTTER Norges ukjente underverden [CAVES Norway's unknown underworld]*. Bergen: Tun Forlag, p. 18–20.

² E-mail from Iain Schröder, 8 January 2015.

Iain Schröder (1948) has discovered, and been the first to explore, a number of caves in several places in Norway. From 2002, he has had annual trips to Tenerife and conducted exploration of the Los Gigantes area and the Teno Mountains. It was through the company «Norsk Underjordssport ANS» that I came in contact with Iain. He had been the general manager, instructor and guide, but he no longer ran the company (1987–2013). Today he is still an active cave explorer and when I contacted him, he invited me on a trip: first to Sandågrota, and then to the mountainous - volcanic area of Los Gigantes in Tenerife, which I visited in February 2017.

³ Sandågrota is a more than 400 metres long cave system near Skrim in Buskerud. It was formed by the river finding passages through the mountains. The bedrock is limestone, and measurements have shown that the riverbed is eroded at a rate of 0.5 mm a year. Beautiful basins are formed when water dissolves the lime in the bedrock. The high velocity of the water produces small scallops, and the low velocity of the water produces large scallops. Also characteristic of the water current in Sandå is all the small and large potholes that are formed by loose particles and water sanding the bedrock.

⁴ The air temperature is around -5 degrees. Under the ground, the ground water rarely freezes.

⁵ Speleology or cave science is the term for the scientific study of caves and their history through the formation of the landscape.

⁶ Lauritsen (2010), op. cit., p. 76.

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