FORMATION OF HELECTITE IN THE CAVE DRAGON BELLY (SARDINIA, ITALY)

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In the cave Dragon Belly, situated in the Golf of Orsei (Sardinia, Italy), a special type of irregular speleothem called helectite was found. The apparent helectites solely exist as stalactites. The helectites are grown in all vertical and horizontal directions with a huge variety in size and shape and do not show any affinity to gravity. According to HILL & FORTI (1997) the apparent speleothem is classified as a thread-like variety of helectite, which usually consists of aragonite. In the present case solely calcitic varieties are found.
Thin section analyses indicate that the vertical central canal for solution migration of our calcitic helectites is clogged at the tip. It is suggested that due to this occlusion the water pressure inside the stalactite had been increased and caused the formation of horizontal canals between 30 and 60 µm in diameter which are circularly arranged. These secondary "canalicules" originate in the central canal and radiate in a sinuous shape to the outer surface of the stalactite. Helectites seem to be grown from their canal and if the solution gets into contact with the atmosphere, precipitation of $CaCO_3$ occurs due to CO_2 degassing.
Optical mineral orientation analyses show that the stalactite consists of concentric arranged single crystallites with pronounced spacing between individual crystals and the helectite consists of calcite crystals with identical structural orientation. SEM imaging indicates rather uniform crystallite size and shape on straight parts of the helectites which may lead to an equally distributed water film with rather constant precipitation conditions. Interestingly at the bended parts the crystallites on the inside of a bend are significantly smaller than on the outside. Thus inside the bend the specific surface area is much higher vs. the outside. We assume that significantly differences in precipitation rates - e.g. induced by a change in wettability, water film thickness and/or CO_2 degasing kinetics - result in distinct crystal sizes for inside vs. outside areas of a bend. The elevated need in volume by $CaCO_3$ formation at the outside of a bend (big crystals) finally leads to a helix shaped form which gives the helectite its name.

HILL, C., FORTI, P. (1997): Cave Minerals of the World. National Speleological Society, 463pp.