

# **The Dolerite of Höhenberge- Discrete part of the Höhenberg-Intrusion-Interval – Profile of the drilling Schnellenberg 1/62 and stratigraphic position of the intrusion in the Rotliegend**

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## **Abstract**

The paper presents a new stratigraphic unit, denoted as Höhenberg-Intrusion-Interval that appears between the underlying Oberhof Formation and the overlying Rotterode Formation (Lower Rotliegend). During this period two magmatic bodies intruded disconformably on flat paths into sediments and volcanic rocks of the Oberhof Formation. The older one is known as Regenbergestein-Rhyolite, the younger one as Höhenberg-Dolerite. The latter is exposed over more than 10 kms in NNS-SSW striking length crossing nearly the whole Thuringian Forest and covers parts of the geological sheets of Waltershausen (5129) and Tambach-Dietharz (5229) whereas the Regenbergestein-Rhyolite occurs over 7 km length in N-S-direction mainly north of the crest of the Thuringian Forest (so called Rennsteig).

At the end of the Oberhof-Formation compressive movements of the Saalian event took place within a NNW-SSE-striking graben. With them, flat anticlines were formed for instance as the NNW-SSE-striking Rennsteig-anticlinal structure. Here, the Dolerite intrusion shows its biggest thickness as it was proved by boring Schnellbach 1/62 that penetrated a sill-like body with 356.8 m thickness. Changes of thermal metamorphism were found on both contact zones.

The Regenbergestein-Rhyolite was exposed in boring Finsterbergen 1/62 with 66 m thickness. The rhyolite is penetrated by dolerite veins of 10...30 m thickness which appear in the overlying part of the intrusion.

According to petrographic and geochemical results obtained from samples of boring Schnellbach 1/62 the dolerite is proved to be a sill with distinctive in-situ differentiation. That is encouraged by the great thickness of the intrusion. A new assessment of previous investigations confirmed that the sill is separated into seven zones of varying composition.

The zones 1 and 7 present the quenched marginal facies of basalt-like density. During intrusion these zones were solidified rapidly, representing nearly the origin magma. In the zones 2 and 6 the chemical composition is modified by absorption of foreign materials which is mostly derived from underlying layers of the sill.

A marker differentiation is seen in zones 3, 4 and 5 that is attributed to fractional crystallization, as well as a gravitative put down of solid phase. Resulting from differentiation processes there were formed mainly quartz-dolerite (zone 3), olivine-bearing dolerite (zone 4) and olivine-dolerite (zone 5).

In the course of a tectonic neutral period a wide range of lateral denudation took place resulting in deep-reaching erosion of the Oberhof Formation (about 600 ms were removed). With it, the flat anticline at the Rennsteig was exposed. Erosional features are also seen on rocks of the upper contact zone as well as on parts of the dolerite.

The Höhenberg-Intrusion-Interval ends with the beginning of deposition of the Rotterode Formation. The axis of the sedimentation area strikes now in NE-SW-direction. Deposits overly disconformably the graben-like structure of the Oberhof Formation.

The basal layers of the Rotterode Formation consist of an alternation of fine- to coarse grained sandstones and conglomerates named as Hoher-Berg-Sandstone. In sections where polymict conglomerates are the dominant rocks the basal sequence is denoted as Struth-conglomerate.

In the northwestern region with deposits of the Rotterode Formation there appear two tuff horizons in the basal layers. A rhyolitic tuff (about 0.4 m thick) is overlain by an andesitic lapilli-tuff of about 5 ms thickness (tuff Rotterode No 1). About 15 m above, a rhyolitic crystal-tuff occurs, 1 to 3 m thick (tuff Rotterode No 2). Besides, there appear numerous veins and subeffusive rocks of basic composition (melaphyre). In the period of erosion that follows, these rocks were partly removed which resulted in a sedimentary gap. The detritus of melaphyre was deposited in small rock-debris showing a transition to layers of the Hoher Berg-sandstone mentioned above respectively to the Struth-conglomerate.

Nearly parallel to the NE-SW-running axis of the Rotterode basin there appear numerous veins of melaphyre within the Oberhof Formation between Tambach-Dietharz and Struth-Helmershof. They are considered as relics of Rotterode volcanism which were partly eroded during the Tambach-Formation time.

Including the subeffusive melaphyre of Roda (Elgersburg Formation) in the likewise subeffusive intercalation of melaphyre in boring Thüringen-Süd 1/63 it might be possible to compare some sections of the Rotterode Formation with the Elgersburg Formation. Resulting from that, the region between the central part of the Thuringian Forest up to its southern foothills appears as a flat basin with wide-spread subeffusive basic vulcanicity in Rotterode time. According to new evaluation of exposures and age determination the course of events is as follows:

Age	Rotterode-Formation	Elgersburg-Formation
275 ± 4 Mio. a *		Elgersburg porphyre *
	<i>subeffusive basic volcanics</i>	<i>Roda melaphyre</i>
	Hoher-Berg-Sandstone (basal layers)	
Gap, Restructuring of the sedimentation area		
280/281 ± 2 Mio. a	<b>Höhenberg-Intrusion-intervall</b>	
283 Mio. a ~~~~~	saalic compressional Event ~~~~~	
	<b>Oberhof-Formation</b>	