

metamorphosed areole as rocks which, at first sight, might be taken for some kind of porphyritic gneiss. Their quartz-pebbles have assumed a resinous aspect, and are enveloped in a crystalline micaceous paste. The metamorphism of the Highlands is referred to on p. 1036 and in Book VI. Part I. § ii.

A classical region for the study of contact-metamorphism is in the Harz, where, round the granite masses of the Brocken and Ramberg, the Devonian and older Palæozoic rocks are altered into various flinty slates and schists which form a ring round the eruptive rock. Dikes and other masses of a crystalline diabase have likewise been erupted through the graywackes and shales, which, in contact and for a varying distance beyond, have been converted into hard siliceous bands (hornstone) and into various finely foliated masses (fleckschiefer, bandschiefer, contactschiefer, the spilosite and desmosite of Zincken). The limestones have their carbon-dioxide replaced by silica in a broad zone of lime-silicate along the contact.²⁵ The black compact limestone of Haserode becomes a white saccharoid marble, charged with silicates (rhombic dodecahedrons of garnet, etc.) and with its carbonaceous matter segregated into abundant veins. A limestone band containing ironstone presents, in the Spitzenberg between Altenau and Harzburg, a garnetiferous magnetite containing well-preserved crinoid stems.²⁶

Round the syenite of Meissen, in Saxony, the diabases when they come within the areole of contact-metamorphism pass into actinolite-schists and anthophyllite-schists.²⁷

The French Pyrenees present instructive examples of the effect of the protrusion of granite and other eruptive rocks upon Cambrian and later formations. Fuchs has traced the metamorphism of clay-slate through spotted schists (frucht-, chiasolite-, and andalusite-schists) into mica-schist and gneiss.²⁸ More recently the region has

²⁵ Zincken, Karsten und v. Dechen, Archiv, v. p. 345; xix. p. 583. Fuchs, N. Jahrb. 1862, pp. 769, 929. K. A. Lossen, Z. Deutsch. Geol. Ges. xix. p. 509 (on the Taunus); xxi. p. 291; xxiv. p. 701. Kayser, op. cit. xxii. p. 103. The memoirs of Lossen form some of the most important contributions to our knowledge of the phenomena of metamorphism.

²⁶ K. A. Lossen, Z. Deutsch. Geol. Ges. xxix. 1877, p. 206. Erläuter. Geol. Special-Kart. Preuss. Blatt, Harzgerode, 1882.

²⁷ K. Dalmar, Blatt 64 (Tanneberg), Erläuter. Special-Kart. Sachsen, 1889; A. Sauer, op. cit. Blatt 48 (Meissen).

²⁸ N. Jahrb. 1870, p. 742; see also Zirkel, Zeitsch. Deutsch. Geol. Ges. xix. 1867, p. 175.