

Eifel volcanic region, the fragments of mica-schist and gneiss ejected with the volcanic detritus have sometimes a crust or glaze of glass. Sandstones, though most frequently baked into a compact quartzite, are sometimes changed into an enamel-like mass in which, when the rock contains an argillaceous or calcareous matrix with dispersed quartz-grains, the infusible quartz may be recognized (Oberellenbach, Lower Hesse). According to Bunsen's observations, volcanic tuff and phonolite have sometimes been melted for several feet on the sides of the dolerite dikes which traverse them, so as to present the aspect of pitchstone or obsidian.¹⁰ Besides complete fusion and fluxion-structure there has sometimes been also a production of microscopic crystallites in the fused portions, resembling those of eruptive rocks.

The effects of eruptive rocks upon carbonaceous beds, and particularly upon coal-seams, are among the most conspicuous examples of this kind of alteration. In a coal-field much invaded by igneous rocks, seams of coal are usually found to have suffered more than the other strata, not merely because they are specially liable to alteration from the proximity of heated surfaces, but because they have presented lines of more easy escape for the igneous matter pressed from below. The molten rock has very generally been injected along the coal-seams; sometimes taking the lower, sometimes the upper surface, or even, as already stated, forcing its way along the centre.

The alterations produced by the intrusion vary considerably, according to the bulk and nature of the eruptive sheet,

¹⁰ Usually the vitreous band at the margin of a basalt dike belongs to the intruded rock and not to that through which it has risen (see "Basalt-glass," ante, pp. 297, 969).