

dant microscopic microlites occur, and present in their arrangement evidence of a fluxion-structure. This glassy constituent probably represents the argillaceous and other materials in which the quartz-grains were originally imbedded, and which has been fused and made to flow by the heat of the basalt.¹⁷

Among localities where the development of new minerals in proximity to eruptive rock has taken place on the most extensive scale, none have been more frequently or carefully described than some in the group of mountains lying to the east and southeast of Botzen, in the Tyrol (Monzoni, Predazzo). Limestones of Lower Triassic (or Permian) age have there been invaded by masses of monzonite (a rock intermediate between syenite and diorite, sometimes containing much augite), granite, melaphyre, diabase, and orthoclase-porphry. They have become coarsely-crystalline marble, portions of them being completely enveloped in the eruptive rock. But their most remarkable feature is that in them, and in the eruptive rocks in contact with them, many minerals often beautifully crystallized have been developed, including garnet, idocrase, gehlenite, fassaïte, pistacite, spinel, anorthite, mica, magnetic iron, hæmatite, apatite, and serpentine. Some of these minerals occur chiefly or only in the eruptive masses, others more frequently in the limestone, which is marked by a lime-silicate hornstone zone along the junction. But these are all products of contact of the two kinds of rock. Layers of carbonates (calcite, also with brucite) alternate with laminæ and streaks of various silicates, in a manner strikingly similar to the arrangement found in limestones among areas of regional metamorphism, where no visible intrusive rock has influenced the phenomena.¹⁸

Production of Foliation.—This is the most complete kind of metamorphic change, for not only are new minerals de-

¹⁷ N. Jahrb. 1872, p. 7. For other examples see Mohl, Verhandl. Geol. Reichsanst. 171, p. 259; Hussak, Tschermak's Min. Mittheil. 1883, p. 530.

¹⁸ On the Monzoni region, see Doelter, Jahrb. Geol. Reichsanstalt, 1875, p. 207, where a bibliography of the locality up to the date of publication will be found. Other papers have since appeared, of which the following dealing with the phenomena of contact-metamorphism may be mentioned. G. von Rath, Z. Deutsch. Geol. Ges. 1875, p. 343; "Der Monzoni in südöstlichen Tirol," Bonn, 1875; Lemberg, Z. Deutsch. Geol. Ges. 1877, p. 457.