porphyries or granite-porphyries of the massive rocks, but it is usually distinguishable by a more or less foliated structure, and by the absence of felsitic ground-mass.

14. Quartz-, Felspar-, and Mica-Rocks.—**Gneiss.**—This name, formerly restricted to a schistose aggregate of orthoclase (sometimes microline or a plagioclastic felspar, either separate or crystallized together), quartz, and mica, is now commonly employed in a wider sense to denote the coarser schists which so often present granitoid characters.[230] Many gneisses, indeed, differ from granite chiefly in the foliated arrangement of the minerals. The quartz sometimes contains abundant liquid inclusions, in which liquid carbon-dioxide has been detected. The relative proportions of the minerals, and the manner in which they are grouped with each other, present great variations. As a rule, the folia are coarser, and the schistose character less perfect than in mica-schist. Sometimes the quartz lies in tolerably pure bands, a foot or even more in thickness, with plates of mica scattered through it. These quartz layers may be replaced by a crystalline mixture of quartz and felspar, or the felspar will take the form of independent lenticular folia, while the laminæ of mica which lie so abundantly in the rock give it its fissile structure. The felspar of many gneisses presents under the microscope a remarkable fibrous structure, due to the crystallization of fine lamellæ of some plagioclase (albite or oligoclase) in the main mass of orthoclase or microcline.[231] Among the accessory minerals, garnet, tourmaline or schorl, hornblende, apatite, graphite, pyrites, and magnetite may be enumerated.

There can be no doubt that many gneisses owe their characteristic schistose structure to the crushing and shearing of some original eruptive rock such as granite. Instances, however, occur where the materials are segregated in bands which so closely resemble those of true flow-structure or segregation in igneous bosses and sheets as to suggest that they may possibly have resulted from the movement of a still unconsolidated eruptive mass (pp. 306, 1022). Analogies to such structures may be observed among ancient and modern lavas.

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[230] See Kalkowsky's "Gneissformation des Eulengebirges," Leipzig, 1878; Lehmann's "Altkrystallinische Schiefergesteine," 1884; F. Becke, Tschermak's Min. Mitth. 1882, p. 194; E. Weber, op. cit. 1884, p. 1, and postea Book IV. Part VIII. § ii. and Book VI. Pre-Cambrian.

[231] F. Becke (Tschermak's Min. Mitth. 1882, (iv.) p. 198) described this structure and named it *microperthite*.