

Many varieties of gneiss occur. Some are distinguished by peculiarities of structure or composition, as Granite-gneiss, where the schistose arrangement is so coarse as to be unrecognizable, save in a large mass of the rock; Diorite-gneiss, gabbro-gneiss, composed of the materials of a diorite or gabbro but with a coarsely schistose structure; Porphyritic gneiss or Augen-gneiss, in which large eye-like kernels of orthoclase or quartz are dispersed through a finer matrix and represent larger crystals or crystalline aggregates which have been broken down and dragged along by shearing movements in the rock. Other varieties are named from the occurrence in them of one or more distinguishing minerals, as Hornblende-gneiss (syenitic gneiss), in which hornblende occurs instead of or in addition to mica; Protogine-gneiss, where the ordinary mica is altered into chlorite or a talc-like substance; Sericite-gneiss, a schistose aggregate of sericite, albite, quartz, with less frequently white and black mica and a chloritic mineral;²³² Augite-gneiss, containing an augitic mineral (not of the diallage group) and potash-felspar or potash-soda-felspar or scapolite, with hornblende (which has often crystallized parallel with the augite), brown mica, more or less quartz, and also frequently with garnet, calcite, titanite, etc.;²³³ Plagioclase-gneiss, with plagioclase more abundant than orthoclase, sometimes containing hornblende, sometimes augite; Cordierite-gneiss, with the bluish vitreous mineral cordierite.

The most typical gneisses occur among the so-called "Archæan rocks," of which they form the leading type, and where they probably represent original eruptive rocks. (See Book VI. Part I.) They cover considerable areas in Scandinavia, N. W. Scotland, Bohemia, Bavaria, Erzgebirge, Moravia, Central Alps, Canada, etc. But rocks to which the name of gneiss cannot be refused appear also among the products of the metamorphism of various stratified formations. Such are the gneisses associated with many other crystalline schists among the altered Cambrian and Silurian rocks of Scotland, Norway, and New England,

²³² K. A. Lossen, *Zeitsch. Deutsch. Geol. Ges.* xix. (1867), p. 565.

²³³ The occurrence of augite as an abundant constituent of some gneisses has been made known by microscopic research. Rocks of this nature occur in Sweden (A. Stelzner, *N. Jahrb.* 1880 (ii.), p. 103), and have been fully described from Lower Austria (F. Becke, *Tschermak's Min. Mitth.* 1882 (iv.), pp. 219-365). They are likewise well developed among the oldest gneisses of the northwest of Sutherland in Scotland.