

or superposition in the members of this family; clay-slate, for example, having been often supposed to hold invariably a higher geological position than mica-schist, and mica-schist always to overlie gneiss. But although such an order may prevail throughout limited districts, it is by no means universal. To this subject, however, I shall again revert, in the 37th chapter, when the chronological relations of the metamorphic rocks are pointed out.

The following may be enumerated as the principal members of the metamorphic class:—gneiss, mica-schist, hornblende-schist, clay-slate, chlorite-schist, hypogene or metamorphic limestone, and certain kinds of quartz-rock or quartzite.

*Gneiss*.—The first of these, gneiss, may be called stratified, or, by those who object to that term, foliated, granite, being formed of the same materials, as granite, namely, felspar, quartz, and mica. In the specimen here figured, the white layers consist almost exclusively of granular felspar, with here and there a speck of mica and grain of quartz. The dark layers are composed of gray quartz and black mica, with occasionally a

Fig. 704.



Fragment of gneiss, natural size: section made at right angles to the planes of foliation.

grain of felspar intermixed. The rock splits most easily in the plane of these darker layers, and the surface thus exposed is almost entirely covered with shining spangles of mica. The accompanying quartz, however, greatly predominates in quantity, but the most ready cleavage is determined by the abundance of mica in certain parts of the dark layer.

Instead of consisting of these thin laminae, gneiss is sometimes simply divided into thick beds, in which the mica has only a slight degree of parallelism to the planes of stratification.

The term "gneiss," however, in geology is commonly used in a wider sense, to designate a formation in which the above-mentioned rock prevails, but with which any one of the other metamorphic rocks, and more especially hornblende-schist, may alternate. These other members of the metamorphic series are, in this case, considered as subordinate to the true gneiss.

The different varieties of rock allied to gneiss, into which felspar enters as an essential ingredient, will be understood by referring to what was said of granite. Thus, for example, hornblende may be superadded to mica, quartz, and felspar, forming a syenitic gneiss; or talc may be substituted for mica, constituting talcose gneiss, a rock composed of felspar, quartz, and talc, in distinct crystals or grains (stratified protogine of the French).