such as occur in the unaltered rock, and the chemical action (brought into activity by heat and moisture) which induced their development, may perhaps in some cases have been assisted by sublimations proceeding from melted matter below. The intensity in many countries of these metamorphisms, extending over many thousands of square miles (as in Scotland, Norway and Sweden, and Canada), and through rocks thousands of feet in thickness, proves that it was the result of a long-continued process, taking place probably in all cases at considerable depths. The whole has then been upheaved and disturbed, often many times, and *after denudation* the gneissic and the more thoroughly metamorphosed and sometimes intrusive granitic rocks were at length exposed at the surface.

Some of the metamorphic rocks, which I have to explain, have been highly disturbed, and in the north occupy about one-half of Scotland. Most of this area includes, and lies north-west of, the Grampian mountains; and I must endeavour to explain by what processes metamorphism of rocks has taken place, not in detail, but simply in such a manner as to give a general idea of the subject.

I have already said that typical gneiss consists of irregular laminæ of *mica*, *quartz*, and *felspar*, and it frequently happens that they are bent, or rather minutely folded, in a great number of convolutions, so small, that in a few yards of gneiss they may sometimes be counted by the hundred. All these metamorphic rocks and granite, were by the old geologists called Primary or *Primitive* strata, and were considered to have been formed in the earliest stages of the world's history, because in those countries that were first geologically described, they were supposed to lie always