

forgotten that, as a general rule, the less crystalline rocks do really occur in the upper, and the more crystalline in the lower part of each metamorphic series.

Moreover, metamorphism must often begin to exert its force long after the strata have assumed a vertical position, and it may then act locally or within limited areas, and will be as likely to affect the newer as the older beds. As an illustration of such partial conversion into gneiss of portions of a highly inclined set of beds, I may cite Sir R. Murchison's memoir on the structure of the Alps. Slates provincially termed "flysch" (see above, p. 230), overlying the nummulite limestone of Eocene date, and comprising some arenaceous and some calcareous layers, are seen to alternate several times with bands of granitoid rock, answering in character to gneiss.\* In this case heat, or vapor, or water at an intensely high temperature, may have traversed the more permeable beds, and altered them so far as to admit of an internal movement and re-arrangement of the molecules, while the adjoining strata did not give passage to the same heat, or if so, remained unchanged because they were composed of less fusible materials. Whatever hypothesis we adopt, the phenomena establish beyond a doubt the possibility of the development of the metamorphic structure in a tertiary deposit in planes parallel to those of stratification.

Whether such parallelism be the rule or the exception in gneiss, mica-schist, and other formations of the same family, is a question which I shall discuss at length in the next chapter.

\* Geol. Quart. Journ. vol. v. p. 211 1848.