

structures peculiar to some calcareous or allied rocks; while in the typical gneissic granite or granitoid gneiss, all the original structural lines are obliterated; they or any subsequent foliation being replaced by a nearly perpendicular one; but the strata of this new foliation seems to follow the strike of the original stratification.

In some places there is a hard boundary between the gneissic granite and the gneiss; or the latter may be absent, the granite being margined by schist. This seems to suggest that it is possible the coarse foliation of the gneissic granite may be due to a second *Metapepsis* of a more limited extent; that while it affected them and developed the leaves of foliation, it did not invade the adjoining strata. We will now proceed to the metamorphic rocks of Canada.<sup>1</sup>

A feature that strikes a stranger is the massive coarseness of the foliation in some of the Laurentian gneiss. This appears to me, as mentioned in connection with the Irish rocks, to be due not to excessive metamorphism at one and the same time; but to stages, the rocks having been invaded two, three, or even many more times by successive but independent periods of metamorphism; thus developing but not obliterating the leaves due to the earlier metamorphisms.<sup>2</sup>

This coarse foliation is very conspicuous in the previously mentioned gneissic granite called Labradorians by the Canadian geologists. Of it we have no exact representatives among the Irish rocks; the nearest approach in structure being the gneissic granites of Carnsore, co. Wexford; of the barony of Moycullen, co. Galway; of the Erris district, co. Mayo; and of the Castlebar district, also in Mayo. The latter being an intrusion, is in this respect more like the Canadian rocks than the others, which were originally stratified rocks.<sup>3</sup>

<sup>1</sup> It appears remarkable that metamorphism seems to be so restricted to the older rocks in Canada. Is it possible, that in the areas called Archean, from their lithological character, there may be newer rocks included? If not, why should metamorphism be so confined to them, when in a little spot like Ireland we have metamorphosed Cambrians, Cambro-Silurians, Devonian-Silurians, Carboniferous (?) and Lias.

<sup>2</sup> Excessive metamorphic action in a portion of an area will change rocks into granite; but if a milder metamorphism invades rocks at different successive times, it ought to more and more develop the plates or leaves without obliterating them. This can be seen on a small scale in different places in Ireland, the best perhaps being along the before-mentioned boundary of the older, or "Slieve Croob" granite of the Mourne Mountain district. In general in Irish localities the additional metamorphism seems due to *Metapepsis*, succeeding *Paroptesis*, or *vice versa*; but in some places one period of *Metapepsis* seems to have been followed by another. As the Canadian rocks are so ancient, we may suppose that at least three or four times they have been covered by a sufficient depth of strata to develop metamorphic action, but not sufficient to convert them into typical granite. It appears to me an interesting problem, why in such vast areas we should have gneiss without its being, in part, converted into granite of metamorphic origin? Unless we suppose that some of the rocks that are now gneiss were at one time granite, but by subsequent metamorphic action foliation was developed in it, and thus by degrees it was changed into gneiss. Such a change can take place; because if the "Slieve Croob granite" was covered up with a sufficient depth of strata, it would be entirely converted into gneiss.

<sup>3</sup> Mixed up, either as strata or small intrusions, with these rocks of Wexford, Galway, and Mayo, are eruptive rocks; they, however, were portions of the geological groups (Cambrians and Cambro-Silurians) and not subsequent intrusions, as was the case in respect to the Castlebar district porphyritic gneiss.