

the views of geologists regarding metamorphism, and are therefore without that knowledge of the true meaning of structural characters and that detailed study of the tectonic relations of the rocks which the present condition of the science demands. There can be no doubt that the older crystalline rocks of Scandinavia are a prolongation of those which further to the southwest rise out of the Atlantic in the Highlands of Scotland and the hills of the north and west of Ireland. And there seems every probability that the broad features of geological structure which have been ascertained to prevail in the British area will be found to extend also into Norway and Sweden.⁴⁷

Wide tracts of western Norway consist of coarse banded gneisses (Grundfjeldet, Urberget), which present the closest resemblance to the Lewisian series of Sutherland and Ross, but with a wider range of petrographical diversity. They include red and gray gneisses, banded and streaked granulites, epidote-gneiss, cordierite-gneiss, granites, syenites, gabbros, diorites, labradorite-rocks, garnet-rocks, amphibolites, peridotites, serpentines, etc. The general assemblage of these rocks suggests that they represent a complex series of acid and basic eruptive masses. With them is intimately associated another group of rocks, of which conspicuous members are quartzite, limestone, mica-schist, quartz-schist, and others which point with more or less clearness to a sedimentary origin. This group is usually quite crystalline, and is certainly older than some portions of the gneisses which can be seen to pierce it. It contains, however, bands of amphibolite, which may represent sills intruded between its component layers. Thus at Rukedal (Southern Norway) a mass, 3900 feet thick, of quartzite, quartz-schist, and interbedded seams of hornblende-schist, lies upon a group of hornblende-schists and gray gneiss traversed by abundant granite veins. Thin bands of limestone occasionally occur in the gneiss, as near Christiansand, where they have yielded many minerals, especially vesuvianite, coccolite, scapolite, phlogopite, chondrodite, and black spinel. Apatite with magnetite, titaniferous iron, hæmatite, and other ores forms a marked feature of the Norwegian pre-Cambrian series. The most important mineral masses in an industrial sense

⁴⁷ As the result of two journeys in Norway from Bergen to Hammerfest I was convinced of this general parallelism, but the determination of the detailed stratigraphy of the country will be a task of incredible labor demanding from the Scandinavian geologists many years of patient application.