

Dalsland group.—Seen in Dalsland only, and composed of an upper group of shales or slates lying on a quartzite series, below which lies a lower shaly series followed by a thick group of sandstones and coarse conglomerates. The total thickness according to Törnebohm is 1900 metres.

Central Europe.—From Scandinavia, a great series of crystalline schists presumed to be pre-Cambrian ranges through Finland⁵⁰ into the northwest of Russia, reappearing in the northeast of that vast empire in Petchora Land down to the White Sea, and rising in the nucleus of the chain of the Ural Mountains, and still further south in Podolia. In Central Europe, similar rocks appear as islands in the midst of more recent formations. Among the Carpathian Mountains, they protrude at a number of points. Westward of the central portion of the Alpine chain, they rise in a more continuous belt, and show numerous mineralogical varieties, including gneiss, mica-schist, and many other schists, as well as limestone and serpentine. Some of these rocks are certainly altered sedimentary deposits, others are probably crushed igneous rocks. The protogine of the Alps has been shown by Michel-Lévy to be intrusive. It behaves to the surrounding schists as some parts of the Laurentian gneiss of Canada do to the schists next to that rock.

Pre-Cambrian rocks rise to the surface in a number of detached areas in France, particularly in Brittany, the Cotentin, the central plateau, Morvan, Cevennes, the Pyrenees, the Dauphiny Alps, and the Vosges. In Brittany they have recently been carefully studied by Dr. Barrois, who describes them as largely composed of mica-schists, passing often into gneiss and into quartzite, and including chlorite-schists, amphibolites, talcose and sericitic schists, serpentines, eclogites, and pyroxenites.⁵¹ Extensive masses of granitoid and granulitic gneisses with mica-schists, amphibolites and other crystalline rocks form the foundation of the great central plateau of France. In Brittany, in the central plateau, as well as in other regions of France, thick masses of slates and phyllites occur which by some writers have been placed in the pre-Cambrian series. In the Coten-

⁵⁰ The petrographical characters of the vast area of ancient gneiss in Finland are now being carefully mapped and described by the Geological Survey of that country under K. A. Moberg. Each sheet of the map, of which twenty-one have been published up to the present time (July, 1893), is accompanied by an explanatory pamphlet.

⁵¹ Ann. Soc. Geol. Nord, x. xiv. xvi.