

places in the Shield the oldest rocks are altered volcanic types in general called greenstones (Keewatin). In other places as in some parts of Ontario and Quebec the oldest rocks are limestones and gneisses of sedimentary derivation (Grenville series). Overlying the greenstones, particularly in Ontario, a widespread and thick series of altered sedimentary rocks has been held to be younger than the greenstones and is called Timiskaming series. Detailed studies in several parts of the Shield in recent years have shown that three or more thick greenstone bands are interbedded conformably with sedimentary bands and this suggests that in these places at least there is no definitely younger sedimentary series. Recently, radio-active minerals have been studied as indicators of the age of rocks but, although the method appears very promising, ages cannot yet be obtained with any reliability. For example this method does not indicate equivalency in age between the oldest greenstones in Manitoba and the oldest in Quebec. It seems that no subdivision of Archæan rocks can be made as yet that will hold for any wide area. The rocks of the Archæan are in general gneisses and schists derived from sedimentary, volcanic and intrusive rock types. Granites, and gneisses derived from granitoid rocks, outcrop over a very large part of the Shield. The Archæan Era closed with mountain-building and widespread intrusions of granite.

The rocks of the Proterozoic or late Precambrian Era were laid down unconformably on the older rocks after a very long interval of erosion. The rocks of the Era are mainly sedimentary and consist of quartzite, argillite, conglomerate, limestone and related types. The rocks are divisible into three main systems but these can be recognized in only a few places. The oldest, known variously as the Huronian, Bruce, or Cobalt, is a sedimentary assemblage. Younger than these rocks are other sedimentary rocks known as the Animikie, and younger than these are basaltic flows and other volcanic rocks and sediments called Keweenawan. In most places the rocks of the Era have gentle dips but in a few places they have been affected by mountain-building movements and are steeply folded. These rocks are cut by dykes and sills of diabase and in a few places by stocks of granite.

As in the Archæan there is yet no sure correlation between rocks in different places and in only a few places can Precambrian rocks be placed with certainty in the Huronian, Animikie or Keweenawan and in no one place is there a complete succession of Proterozoic rocks.

In many parts of the Shield the rocks cannot even be placed with certainty in either of the two Eras and are merely regarded as Precambrian. Among such are considerable areas of anorthosite particularly in the eastern half of the Shield, some of which are probably of Archæan age and some of Proterozoic age.

The bedded rocks of the Precambrian are several miles thick.

The period of intrusion and folding in the Keweenawan was followed by a long period during which erosion once again reduced the topography to one of low relief, over which successive invasions of the sea were to take place in the succeeding Palæozoic and Mesozoic Eras. The sediments deposited in these seas were, in turn, largely swept away by erosion in the Tertiary period.

During the Pleistocene or Glacial period, the Shield was heavily glaciated by huge glaciers of continental extent. One of these sheets had its gathering ground west of Hudson Bay and another in the heart of Labrador. From these centres the ice moved out in all directions. In its advance it scoured off the residual soil, smoothed down the topography, polished and striated the rock surface, and by scattering debris irregularly over the surface completely disorganized the drainage.