

which, though not all contemporaneous in age, have all been partly or completely transformed to a crystalline or foliated condition as a result of the regional metamorphism to which they have been subjected. In this respect they are strikingly in contrast with the rocks that succeed them in that the latter are not metamorphosed and retain all the characteristics by which they were originally distinguished. If classified merely on the basis of age, the rocks of the complex must be regarded as belonging to only three groups: (1) a group of recrystallized marine sediments constituting the Grenville series; (2) a group of igneous pyroxenic rocks of intermediate composition intruding the rocks of group 1, constituting the Buckingham series; and (3) batholithic masses of granite and syenite gneisses intrusive into the rocks of groups 1 and 2. But the metamorphic action of the pyroxene gneisses of group 2 on the limestone member of the Grenville series has transformed considerable masses of this rock into diopside and related minerals forming a fourth common rock type generally known as "pyroxenite."

The rocks of the Grenville series, being the least resistant to erosive agencies of all the rocks in the district are generally found to underlie the valleys, whereas the granite gneisses which are least easily eroded, form all the prominent hills (Plate I).

Grenville Series.

The oldest rocks recognized to be present in the Grenville district belong to what is generally known as the Grenville series. It is believed that the rocks of this series were originally laid down as alternating beds of shale, sandstone, and limestone, but, owing to the intense metamorphism to which they have been subjected, the shale has been recrystallized to sillimanite-garnet gneiss (Plate II), the sandstone to vitreous quartz, and the limestone to crystalline limestone (Plates III and IV). The reasons for this conclusion are: (1) chemical analyses of the sillimanite-garnet gneiss member of the series show that this rock has in every detail the chemical composition of a shale and thus the three rock types, sillimanite-garnet gneiss, quartzite, and crystalline limestone have respectively the composition of the three dominant members of marine sedimentary series of the well sorted types, and (2) these rocks occur interstratified with one another in a manner similar in every respect to the way normal marine sedimentary deposits usually occur.

Buckingham Series.

The Buckingham series is a group of igneous pyroxenic rocks found widely distributed throughout the Pre-Cambrian of southern Quebec and eastern Ontario. In the district where the series was originally des-