

Chemical and textural variations in the Bonnell Brook Pluton, Caledonian Highlands, New Brunswick

G.H.J. Guy and S.M. Barr

Department of Geology, Acadia University, Wolfville, Nova Scotia B0P 1X0, Canada

The ca. 550 Ma Bonnell Brook Pluton in the Caledonia terrane of southern New Brunswick consists mostly of medium- to coarse-grained granite with lesser amounts of fine-grained granite, rhyolite, granodiorite, tonalite, diorite, and gabbro. The purpose of this study is to investigate the mineralogical, textural, and chemical variations in the pluton and

the possible causes of these observed variations. Two large granitic bodies comprise most of the pluton. The largest of these is spatially associated with a dioritic intrusion to the southeast and a rhyolitic intrusion to the north. Field relationships among these units are in part ambiguous. The relative ages among the rhyolite, fine-grained granite, and me-

dium- to coarse-grained granite remain unclear. However, it is known that the mafic rocks are the oldest unit. Little evidence has been found for the relationships of the granodiorite and tonalite, which commonly occurs as dykes at or near the contact between the granite and diorite.

Some systematic variations in texture and composition have been identified in the Bonnell Brook Pluton. Fine-grained granite generally occurs along the margins of the larger bodies and in a separate small body. The medium- to coarse-grained granite differs chemically from the fine-grained granite, although there seems to have been a lot of mingling between these two rock types. The fine-grained granite is more

similar in chemistry to the sub-volcanic rhyolitic samples than the medium- to coarse-grained granite. Preliminary investigations suggest that at least two cogenetic magmas, felsic and mafic, were responsible for the formation of the granite and diorite, respectively. The close spatial association of the other lithologies with the granite and diorite suggest that it is unlikely that they represent separate magmas. Hence, the differences may be explained by contamination, thermogravitational diffusion, or some type of hybridization or magma mingling. The fine-grained granite may be due to chilling at margins of magma chambers or higher level emplacement.