The occurrence of primary magmatic layering within the Big Indian Lake pluton, Hants County, Nova Scotia

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Geological observations of drill core combined with preliminary petrographic observations and microprobe analysis suggest that the Big Indian Lake pluton is in part a layered peraluminous granite. The pluton occurs within the South Mountain Batholith approximately 40 km northwest of Halifax. It is comprised of four texturally variable granitic facies, which in order of decreasing abundance are: (1) megacrystic to moderately equigranular monzogranite and leucomonzogranite; (2) porphyritic biotite monzogranite; (3) equigranular leucomonzogranite; and (4) microgranite. The most compelling evidence of igneous layering is provided by intersections of a plagioclase-rich rock containing 50 to 90% euhedral plagioclase crystals and millimetre- to centimetre-thick, modally-enriched bands of biotite and apatite. Intersections of the plagioclase-rich rock within the drill core range from <1 to 45 m thick and are separated vertically by sections of granodiorite and biotite-monzogranite. Contacts of the plagioclase-rich rock with other facies of the pluton are usually gradational and are marked by a progressive increase in biotite and decrease in euhedral plagioclase crystals. Rare, sharp contacts with granodiorite are marked by biotite-rich metasedimentary(?) xenoliths. Similar xenoliths occur within the plagioclase-rich rock restricted to discrete xenolith-rich zones. The occurrence of discrete zones of desilicification, chloritization, and saussuritization within the plagioclase-rich rock indicate infiltration by late- to post-magmatic fluids.

The drill core shows a transition from thick, massive plagioclase-rich rock near the surface to progressively lesser plagioclase-rich rock and more abundant granodiorite and biotite monzogranite into predominately leucomonzogranite and microgranite at depth. The plagioclase crystals are characterized by well-developed normal and oscillatory zoning, and preliminary microprobe analyses have revealed core compositions of An_{51}. The plagioclase crystals are supported by a framework of interstitial minerals including: quartz, K-feldspar, albite, biotite, apatite, cordierite, muscovite, chlorite, and sphene. Their modal abundance ranges from 50% to <5%. The interstitial minerals are commonly euhedral and have sharp grain boundaries with the plagioclase crystals. Detailed petrographic and geochemical studies to determine the origin and significance of the aforementioned features are currently in progress.