

BOLIVIA HILL: GEOLOGICAL SETTING

Compiled by Peter Green, 2017.

Geology is the key to understanding the scenic setting of this region. Throughout this part of New South Wales, granitic rocks are common and as they are more resistant to weathering, form the hills in this region.

The Gatehouse is on the Triassic Bolivia Range Leucomonzogranite, which has been dated to be 241¹ million years old. Monzogranite is a type of igneous rock consisting predominately of a mixture of quartz ('glass looking mineral'), alkali feldspar (red mineral) and plagioclase feldspar (white mineral). Muscovite (in the form of flakes) is also present. Leuco refers to the monzogranite being light in colour.

As molten rock (magma) begins to cool, minerals rich in iron and magnesium form first resulting in a liquid contain higher concentrations of silicon, potassium, sodium and calcium. Consequently, minerals rich in these elements (quartz, feldspar) form later. This is called a fractionation process.

The slower the cooling of the molten rock, the large the crystals that are formed. Different phases of cooling are present as shown by the veins of smaller crystals crossing though the monzogranite mass with its larger crystals (Figure 1).



Figure 1: Example two phases of cooling with finer crystals in a vein cutting across the earlier cooled large crystal 'granite'.

Cooling occurs at depth (~10+ km) and the erosion of the overlying rock has resulted in the monzogranite being at the surface. As the monzogranite has a uniform composition plus the presence of rectangular joints (cracks) results in the formation of the characteristic domes throughout this region. Removal of the overburden may result in the presence of 'sheets' capping these domes.

References:

1. Australian Stratigraphic Units Database.