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# Foel Gron

[SH 301 309]

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## Introduction

The Foel Gron Granophyric Microgranite is the most southern of the peralkaline intrusions of the Nanhoron Suite (Young *et al.*, in press) which crop out in central Llanbedrog, and is closely related to the Nanhoron Microgranite (see the Nanhoron GCR site report). The peralkaline nature of the Nanhoron Suite is extremely unusual among the Ordovician igneous rocks of North Wales and the Foel Gron intrusion is the most evolved component of that suite. It is interpreted as being associated with the Llanbedrog Volcanic Group and represents one of the most evolved lithologies associated with that alkaline igneous centre. The intrusion is elliptical in plan and is intruded into mudstones of the Nant Ffrancon Subgroup (Llanvirn).

The first field description of the Foel Gron intrusion was by Marley (1938), with subsequent descriptions and interpretations of its geochemistry by Tremlett (1972), Croudace (1982) and Young *et al.* (in press).

## Description

The Nanhoron Suite comprises three strongly peralkaline intrusions, the Nanhoron Granophyric Microgranite, the Mynytho Common Riebeckite Microgranite and the Foel Gron Granophyric Microgranite (Figure 6.65). The fine-grained, pale microgranite of the Foel Gron intrusion is very slightly elliptical in plan (330 m N–S, 280 m E–W). It was initially referred to as an aplite (Marley, 1938), until Tremlett (1972) suggested that the term micro-granite is more appropriate. It comprises an equigranular groundmass of anhedral quartz (0.4 mm), subhedral oligoclase (0.4 mm), subhedral alkali feldspar laths (up to 1.4 mm), altered biotite, and 1 mm clusters of quartz and alkali feldspar in granophyric intergrowths. No contacts with the country rocks are exposed, although cleaved mudstones of the upper part of the Nant Ffrancon Subgroup are exposed in close proximity to the microgranite at various points, but particularly on the NE side of the intrusion.

## Interpretation

The elliptical outcrop of the Foel Gron Granophyric Microgranite led Marley (1938) to interpret it as a subvolcanic plug. The intrusion is one of several steeply inclined bodies distributed along a N–S line that has been interpreted by Young *et al.* (in press) as defining one margin of the Llanbedrog centre, which was active during Caradoc (Woolstonian) time.

Regional geochemical variations show increasing fractionation from north to south in the Nanhoron Suite. Rocks of the Foel Gron intrusion are geochemically the most evolved members of the group, with samples plotting in the comendite/pantellerite field of the Nb/Y vs Zr/TiO<sub>2</sub> diagram (Winchester and Floyd, 1977). They have very high concentrations of the incompatible elements Y, Zr, Th and Nb and the rare-earth elements (REE), with very low P<sub>2</sub>O<sub>5</sub> contents.

Chondrite-normalized REE data show steep profiles of light REE enrichment for the Nanhoron Suite, with the Foel Gron Granophyric Microgranite showing the most dramatic values. The steepening of the profiles may be due to zircon removal, which would preferentially deplete the heavy REE. The REE profiles show marked negative Eu anomalies, suggestive of extensive plagioclase fractionation, whereas the negative Ce anomalies are extreme and may be due to fractionation of monazite.

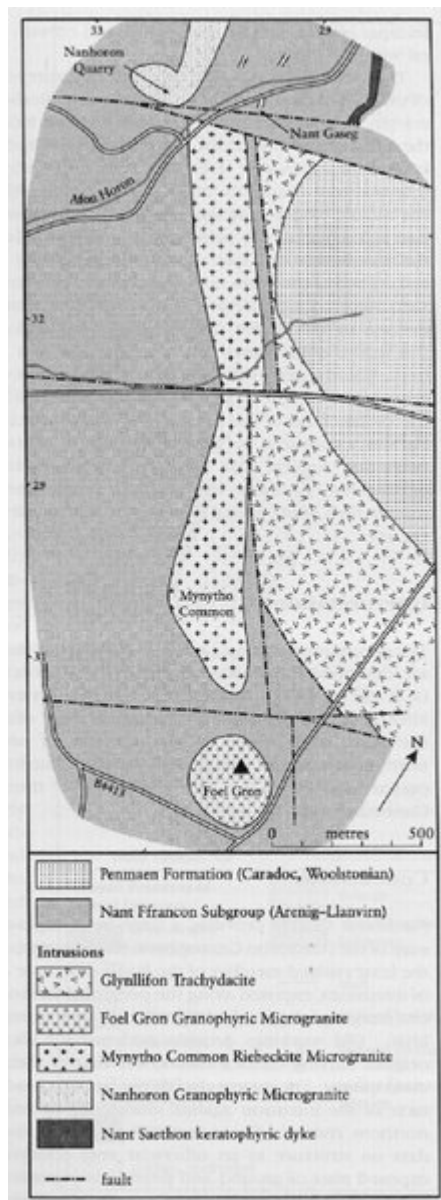
The relationship of the Foel Gron Granophyric Microgranite (and the Nanhoron Suite as a whole) to the other acidic components of the Llanbedrog volcanic centre is uncertain but interesting. The rocks associated with the centre show an evolutionary series from trachybasalts and trachyandesites through to trachydacites and rhyodacites, all showing progressive enrichment in incompatible elements. However, the more rhyolitic compositions show a marked division into

Zr-depleted rocks (the Carneddol Rhyolitic Tuff Formation and the Mynydd Tir-y-cwmwd intrusion) and Zr-enriched rocks (the Nanhoron Suite). Whatever the reason for this striking geochemical subdivision, these Zr values emphasize the geochemically extremely fractionated nature of the Foel Gron Granophyric Microgranite.

## Conclusions

The Foel Gron Granophyric Microgranite is the most evolved component of the Llanbedrog volcanic centre and is the most evolved Ordovician intrusion in North Wales. This intrusion is part of a suite, interpreted as having been emplaced along a major volcanotectonic structure close to, or defining, the western boundary of the Llanbedrog caldera margin. The existence of such a peralkaline rock in the area is an important demonstration of the alkaline nature of the Llanbedrog Volcanic Group, which is in strong contrast with the mostly subalkaline character of Ordovician igneous activity elsewhere in North Wales, especially in the eruptive centres of Snowdonia.

## References



(Figure 6.65) Map showing the distribution of the Nanhoron Suite of intrusions, south Llanbedrog.