

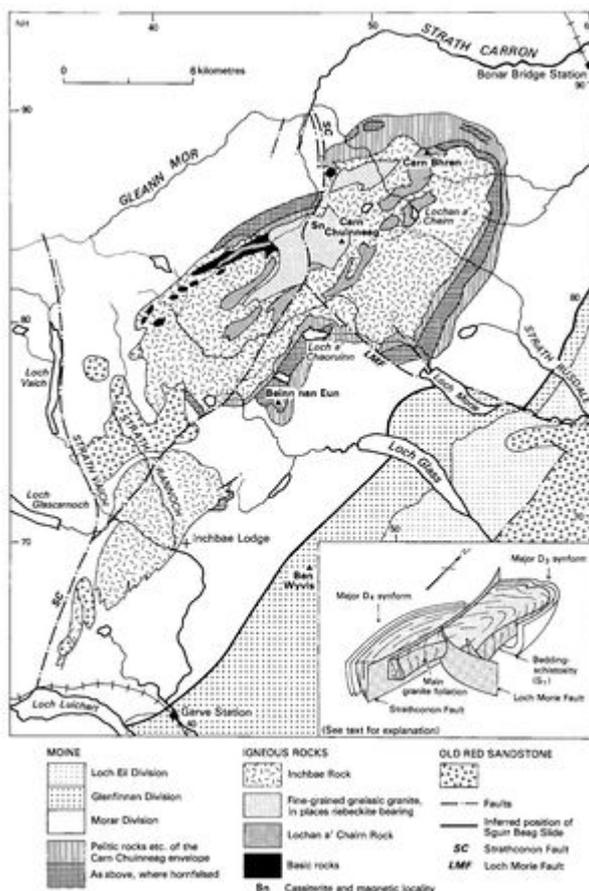
Early granites within the Caledonides, Northern Highlands of Scotland

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Johnstone, G S and Mykura, W. 1989. British regional geology: Northern Highlands of Scotland. Fourth edition. Keyworth, Nottingham: British Geological Survey.

The Carn Chuinneag and Inchbae intrusions



The Carn Chuinneag and Inchbae intrusions. P915478.

The two adjacent masses of Carn Chuinneag and Inchbae ([P915478](#)) were formerly thought to be separate outcrops of the same sheet-like intrusion of foliated granite and associated rocks. More recent studies have suggested that they represent two separate bodies emplaced at slightly different stratigraphic levels, but they are clearly magmatically linked. The intrusions were first described in detail by Peach and others (1912) and have subsequently been studied by several workers who have dealt with their structure or petrology, or both. During this time major changes of interpretation of the form and history of the bodies have take place (e.g. Harker, 1962; Wilson and Shepherd, 1979).

The earliest intrusions in the Carn Chuinneag mass were probably pyroxene gabbro and diorite (Flett, *in* Peach and others, 1912) now largely amphibolitised, veined and brecciated by the Inchbae Rock which forms the main bulk of both the Carn Chuinneag and Inchbae intrusions. This was originally a porphyritic granite with abundant orthoclase phenocrysts, but is now a coarse biotitegranite gneiss in which the phenocrysts are largely deformed to augen wrapped round by a

streaked-out matrix of quartz, biotite, potash feldspar and plagioclase. The alignment of augen and matrix defines the main D_2 gneissic foliation. Garnet is common in the groundmass. A finer-grained, more acid augen gneiss — the Lochan a'Chairn Rock — intrudes and carries xenoliths of the Inchbae Rock. In the Carn Chuinneag intrusion there are small outcrops of riebeckite-bearing gneissic granite and, of more restricted occurrence, a garnetiferous albite gneiss with magnetite- and cassiterite-bearing bands which are found on the north-west flank of Carn Chuinneag ([P915478](#)). These latter rocks have been examined from time to time with a view to possible economic exploitation.

The intrusions (the structural history of which is best shown by the Carn Chuinneag mass) were emplaced subsequent to the first phase of deformation of the Moine country rock (D_1) and after these rocks had undergone regional greenschist-facies metamorphism (Shepherd, 1973). Neither deformation nor metamorphism of the host rocks had been sufficient to destroy the original sedimentary structures within it, and hornfelsing by the intrusions has protected these structures from effacement during subsequent tectonic and metamorphic events to a remarkable degree. The host rocks were originally laminated siliceous and argillaceous sediments, and within the contact aureole of the Carn Chuinneag intrusion sedimentary lamination, cross-bedding, mudcracks and rain-pits are still preserved. The aureole is up to 1.5 km wide.

The rocks of the intrusions are unaffected by the D_1 deformation, but were strongly foliated during the second period of regional folding, when they were extensively recrystallised under amphibolite-grade conditions. The Carn Chuinneag intrusion was then refolded to form the core of a steep-sided (regional D_3) synform, the axis of which plunges moderately SW; it thus appears to occupy a D_3 basin structure similar to that around the Glendessary intrusion. This syncline was further affected by major NW-SE-trending folding (D_4), the combination of D_3 and D_4 folds giving the Carn Chuinneag outcrop its slightly arcuate form, convex to the north-west.

The structure at the south-west end of the Carn Chuinneag intrusion and of the Inchbae intrusion is less well known. Wilson and Shepherd (1979) suggest that the Inchbae granite lies on the continuation of the D_3 synclinal axis that affects Carn Chuinneag, but at a lower stratigraphic level. This implies that the banding of the country rock continues round the south-west end of the Carn Chuinneag mass. As only the base of the Carn Chuinneag intrusion is seen, the overall size and original form of the mass must remain uncertain.

The time of emplacement of the Carn Chuinneag and Inchbae masses (between the regional D_1 and D_2 events) makes them of particular importance in terms of the timing of structural events in the Northern Highlands. The age of emplacement of the Carn Chuinneag pluton has been found to be c.550 Ma (Rb-Sr whole rock; Long, 1964) and c.560 Ma (U-Pb zircon; Pidgeon and Johnson, 1974). If these ages are accepted then they provide a base line for the main penetrative deformation and metamorphism (D_2) of the Moine succession of the area.

The presence of the Carn Chuinneag aureole has provided an interesting opportunity to study the effects of three separate, but superimposed, metamorphic events; the early regional greenschist-facies metamorphism, the contact hornfelsing by the intrusion, and the later regional amphibolite-facies metamorphism. The contact hornfelsing has, in places, enhanced the D_1 fabric by mimetic growth of mica along it, but has more often destroyed it by random overgrowths. Andalusite and cordierite formed in the aureole during the contact metamorphism are now generally represented by pseudomorphs. Kyanite and biotite often define a new fabric parallel to the regional D_2 schistosity, but kyanite is specific to the aureole rocks, and in places, the aureole fabric is totally modified and indistinguishable from the surrounding regionally metamorphosed, garnetiferous, mica schists (Wilson and Shepherd, 1979).

[Selected bibliography](#)

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