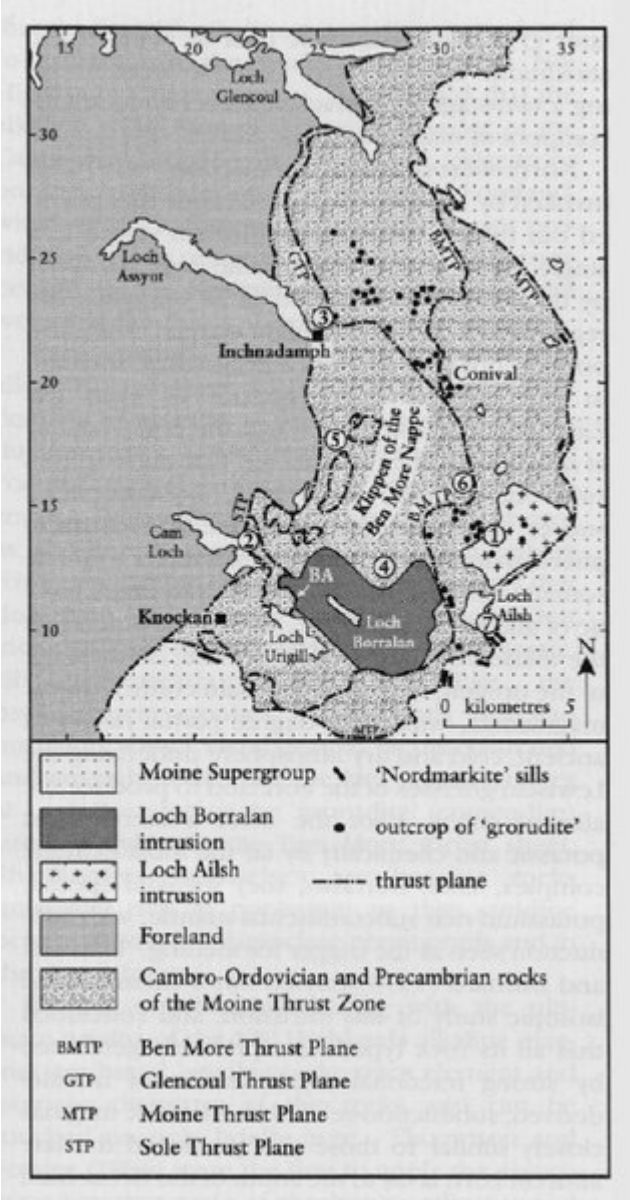
5. 'Nordmarkite' (quartz-microsyenite)

Introduction

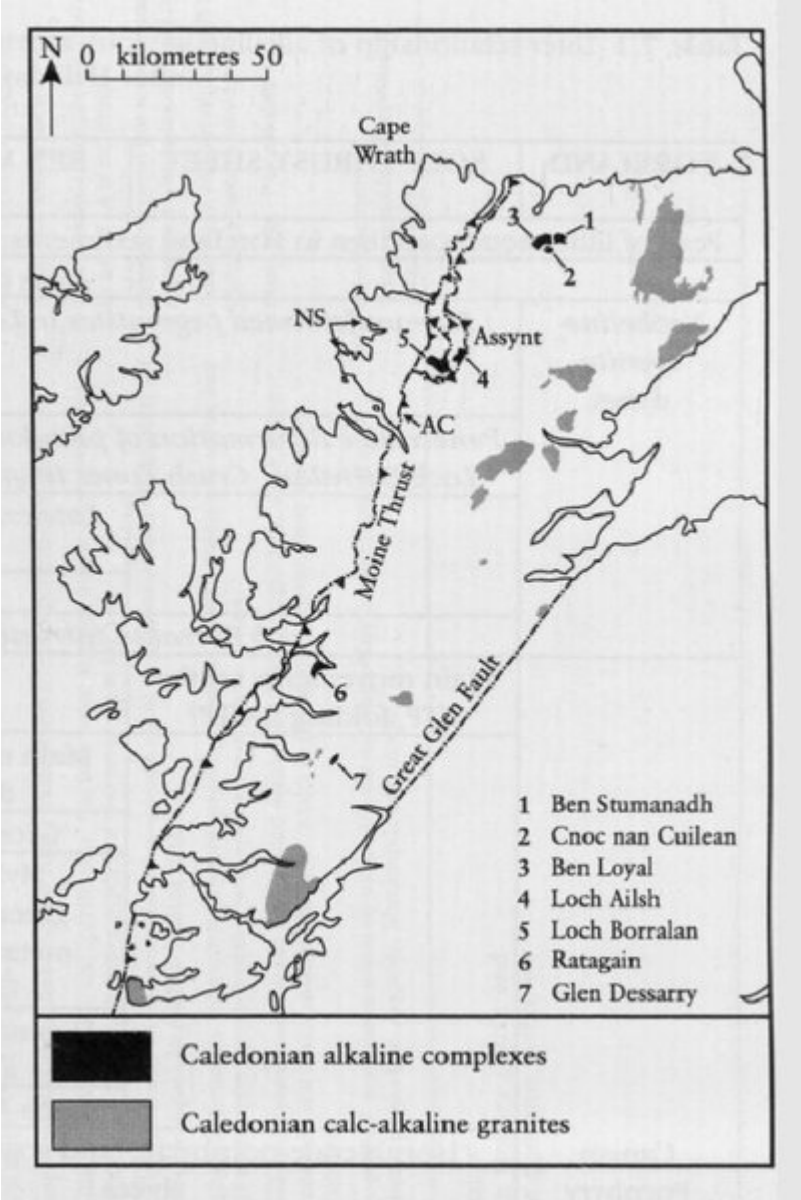
This rock type occurs as sills in Assynt (Figure 7.2) and near Ullapool in the Achall structure (Figure 7.1). Their distribution is much more restricted than other types in the thrust belt because they are invariably found emplaced very close to the Moine Thrust itself, either in the Moine rocks just above the thrust plane, or in Cambro-Ordovician strata immediately below. They are thus unique in that their emplacement was apparently localized by the thrust structure itself, and in being emplaced in part in the Moine Nappe. The thickest sill, some 10 m thick, is emplaced just above the Moine Thrust at Druim Poll Eòghainn [NC 212 090] south of Knockan. Sabine (1953) reported that one of the least altered examples comes from a sill on Maol Calaisceig east of Ullapool (around [NH 144 944]) and he provides a map (Sabine, 1953, fig. 6) and a detailed petrographical description. A detailed structural map of the Achall Culmination is in Elliott and Johnson (1980, fig. 22). They point out that the sill described by Sabine is slightly oblique to the foliation of the Moine rocks, so that its proximity to the Moine Thrust is to some extent fortuitous. Nevertheless the 'nordmarkites' do in general seem to be concentrated near the Moine thrust plane. The complete absence of any other members of the alkaline suite in the Moine Nappe is extremely striking and implies that the 'nordmarkites' were emplaced late in the tectonic history of Assynt (Halliday *et al.,* 1987, table 1). As many examples are considerably deformed, late movements on the Moine Thrust must have occurred. This is an important conclusion for the tectonic reconstruction of the Moine thrust zone.

The 'nordmarkite' suite is varied petrographically and there is considerable range in quartz content and content of mafic minerals. Thus some are strictly syenites or pyroxene syenites. They are usually composed of variably fractured alkali feldspar crystals, easily visible in hand specimen, set in a finc-graincd matrix of alkali feldspar, variable amounts of quartz, and chlorite. The rocks are strongly alkaline and similar in composition to the Canisp Porphyry in the Foreland, but the structural relationships of these two rock types suggests that the Canisp Porphyry was emplaced early and the 'nordmarkite' sills late. The quartz-syenites of Cnoc-na-Sroine in the Loch Borralan intrusion are also chemically similar and possibly almost contemporaneous (Halliday *et al.,* 1987, table 1). Sabine discusses the possibility that the 'nordmarkites' were metamorphosed in the main regional metamorphism of the Moine, but favours the more modern view that the metamorphic changes occurred during later movements localized on the Moine Thrust.

References



(Figure 7.2) Map of the Assynt district showing the major thrusts, the two major alkaline intrusions, and the distribution of two of the six types of minor intrusive rocks. BA is the critical locality, at Bad na h-Achlaise, where nepheline-syenites and pyroxenites of the Loch Borralan intrusion are intruded into one of the klippen (the Cam Loch Klippe) of the Ben More Nappe. GCR sites in the thrust zone related to minor intrusive rocks are shown by circled numbers. 'Grorudite': 1, Glen Oykel South; 2, Creag na h-Innse Ruaidhe. 'Hornblende porphyrite': 3, Cnoc an Droighinn; 4, Luban Croma. 'Vogesite': 5, Allt nan Uamh; 6, Glen Oykel North (diatreme). 'Nordmarkite': 7, Allt na Cailliche. (After Sabine, 1953 and Johnson and Parsons, 1979, fig. 3.)



(Figure 7.1) Map of NW Scotland showing localities of alkaline intrusions, aligned roughly parallel to the Moine Thrust. Many alkaline dykes and sills occur in the Assynt district and also near Ullapool in the Achall Culmination (AC). GCR sites exemplifying nepheline-syenite dykes in the Foreland are indicated by NS. Caledonian calc-alkaline granites NW of the Great Glen are also shown. The Ratagain intrusion is largely calc-alkaline in character but has minor syenitic members (after Halliday et al., 1987, fig. 1).