

GLEN OYKEL NORTH

OS Grid Reference: NC312161

Description

This locality is in the floor of the Oykel valley about 1 km upstream of the western contact of the Loch Ailsh intrusion (Figure 7.2). Peach (in Peach *et al.*, 1907, p. 435) treated it in some detail and provided a charming 'ground plan' reproduced here as Figure 7.18. It is a roughly circular area about 22 m × 15 m, composed of variably sized jumbled blocks of hardened limestone, which Peach ascribed chiefly to the Eilean Dubh Formation of the Durness Group, in a carbonate matrix, surrounded by Pipe Rock and by a 3 to 5 m-thick vogesite sill, which extends southwards in the Pipe Rock. The breccia is arranged in layers of coarser- and finer-sized fragments, dipping steeply towards the edges of the depression in which the breccia lies. The breccia body has steep, clean-cut walls. The vogesite sill is emplaced in the Pipe Rock, which dips to the NE at 15–20°. According to Peach, the sill is later than the breccia, sends tongues into it, and has flowed between the limestone blocks, in some cases detaching them. A large mass of quartzite is also suspended in the vogesite. Peach noted that the vogesite is 'vesicular and slaggy' and Sabine (1953, p. 157) noted that it is very heavily pyritized where it intrudes the marble, more so than any other of the post-Cambrian sills in Assynt.

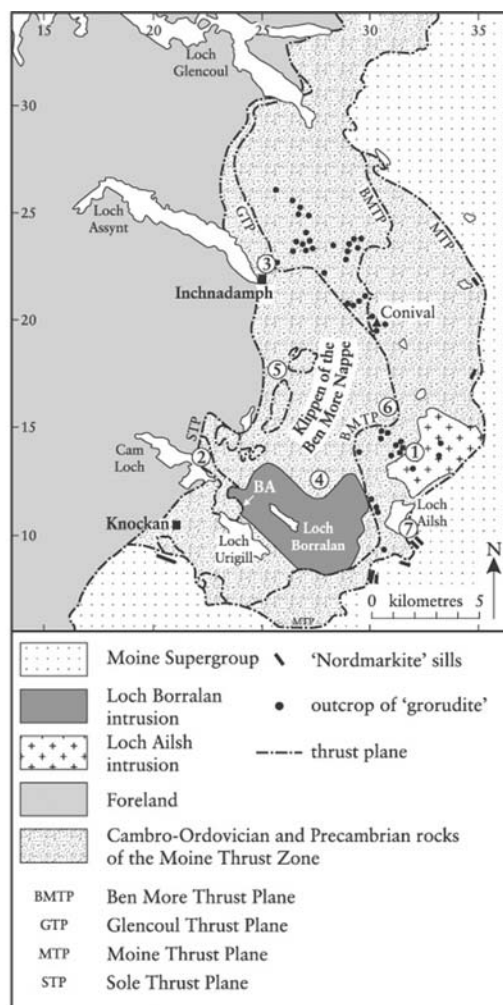


Figure 7.2: Map of the Assynt district showing the major thrusts, the two major alkaline intrusions, and the distribution of two of the six types of minor intrusive rocks. BA is the critical locality, at Bad na h-Achlaise, where nepheline-syenites and pyroxenites of the Loch Borralan intrusion are intruded 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. 'Gorudite': 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 (diatrema). 'Nordmarkite': 7, Allt na Cailliche. (After Sabine, 1953 and Johnson and Parsons, 1979, fig. 3.)

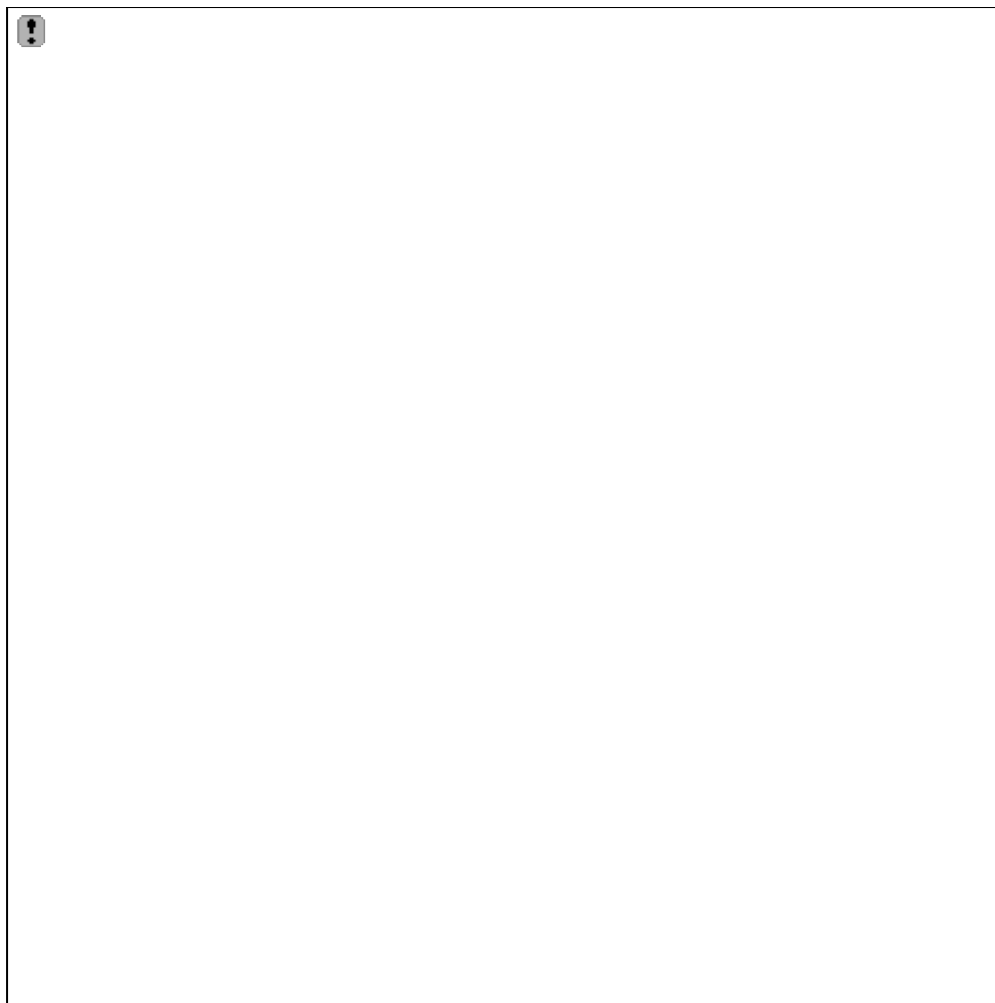


Figure 7.18: Facsimile of B.N. Peach's 'Ground Plan of possible Volcanic Vent, River Oykel, about three miles above Loch Ailsh' (from Peach et al., 1907).

Interpretation

It is possible that Peach's interpretation of the general character of this locality is correct, although 'diatreme' would be a better modern description than 'volcanic vent'. If so it is the only example of transport by gas in the entire NW Highlands alkaline suite. The relationship of the vogesite to the diatreme is not clear. Sabine considered that the unusual pyritization lends weight to Peach's hypothesis that the breccia is volcanic in origin, although it is not clear how this equates with Peach's interpretation of the age relationships. Neither is it clear why the vogesite should have the vesicular character noted by Peach, if it is later than the breccia.

Peach discusses the age relationships of the pipe and the implications of its infill of limestone blocks. Because he was confident that the vogesite and 'hornblende porphyrite' sills in Assynt were emplaced prior to all the thrust movements, he concluded that the limestone blocks must have descended into the vent from above, estimating a minimum descent of about 70 m, the distance from the base of the Eilean Dubh Formation to the top of the Pipe Rock. On this basis the pipe formed prior to the thrusting in Assynt. On the other hand, if the vogesite is earlier than the breccia, and the shape of the body, the pyritization and the unusual vesicular character of the vogesite suggest that this may be the case, the breccia could have been emplaced later than the thrusting and could have incorporated limestone from hidden thrust sheets or from unmoved limestone beneath the Sole Thrust. The possibility, suggested by the presence of a carbonatite body near Loch Urigill (see the Loch Borralan GCR site report), that the matrix of the breccia might have been a hot carbonatite magma, can be ruled out because of recent measurements of carbon and oxygen isotopes. Both breccia fragments and matrix have identical isotopic compositions, characteristic of sedimentary carbonate rocks (K.M. Goodenough, pers. comm., 1997).

Conclusions

At the Glen Oykel North GCR site a pyritized vogesite sill is intimately associated with a jumbled mass of marble blocks, both being intruded into Pipe Rock. The structure was interpreted as a 'volcanic vent' by Peach *et al.* (1907). No other example of such a vent (or diatrema) is known in the NW Highlands alkaline suite. This is an intriguing locality of considerable historical and current importance. One hypothesis is best stated in Peach's own words:

'The appearances here observable afford plausible ground for believing that this orifice in the quartzite was a true volcanic vent, whence only gases may have escaped, and which was filled up by the descent of fragments from the walls of limestone above.'

On the other hand, if the diatrema is later than the vogesite, the limestone may have come from beneath the Sole Thrust. The carbonate matrix of the diatrema is not of igneous origin (i.e. it is not carbonatite).

Reference list

- Peach, B. N., Horne, J., Gunn, W., Clough, C. T., Hinxman, L. W. and Teall, J. J. H. (1907) The geological structure of the North-West Highlands of Scotland. *Memoir of the Geological Survey of the United Kingdom*.
- Sabine, P. A. (1953) The petrography and geological significance of the post-Cambrian minor intrusions of Assynt and the adjoining districts of north-west Scotland. *Quarterly Journal of the Geological Society of London*, **109**, 137–71.