Corrygills Shore

OS Grid Reference: NS042353

Highlights

The early, thick Clauchlands crinanite (analcite–olivine dolerite) sill forms part of a possible cone-sheet system focused on Lamlash Bay. The Corrygills Pitchstone is an outstanding example of a natural glass, representing a quenched granitic magma.

Introduction

The site comprises the coast and adjoining cliffs for about 1.5 km north from Clauchlands Point and extends as far inland as the hill of Dun Dubh. Excellent exposures of variably textured crinanite in a thick sill form Clauchlands Point, to the north, the Corrygills pitchstone sill crops out. The site also contains good examples of dolerite, basalt and felsite dykes. Permian sediments, including coarse breccias, conglomerates and dune-bedded sandstones, are the country rock in this area (Fig. 6.10).

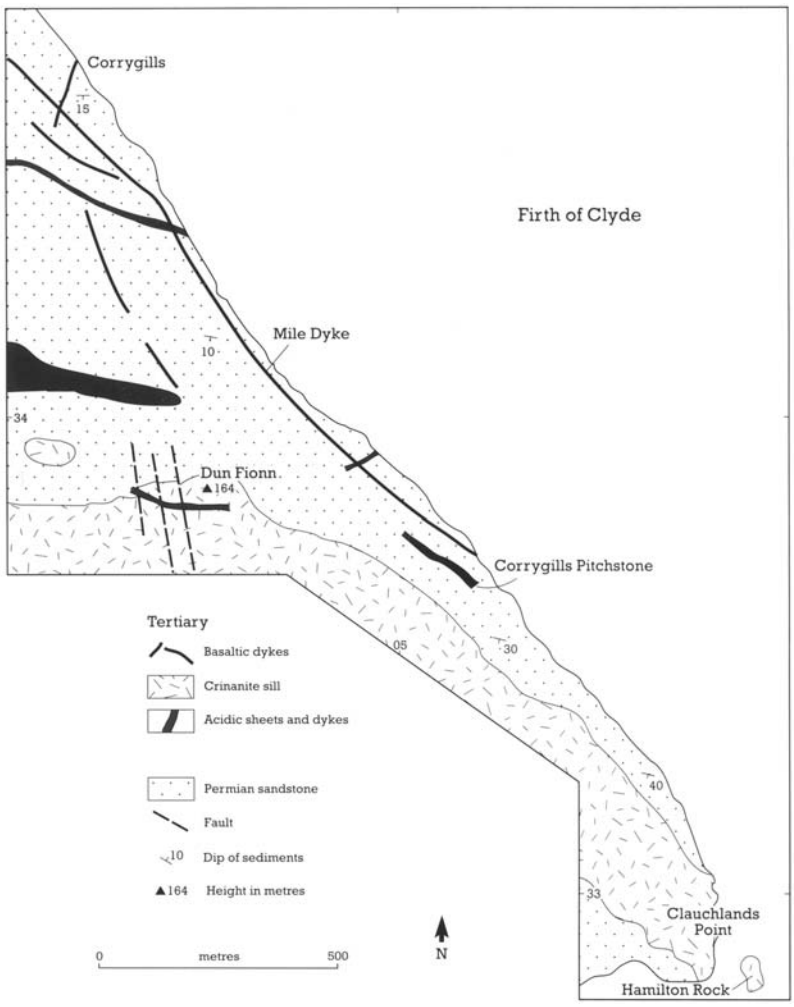

Figure 6.10: Geological map of the Corrygills Shore site (adapted from the British Geological Survey 1:50,000 Special District Sheet, Arran)

Description

The 30–35 m thick Clauchlands Sill is well exposed on the scarp below Dun Fionn (NS 047 338) and at Clauchlands Point. The rock is a coarse-grained analcite olivine dolerite (crinanite) which is generally deeply weathered to give a spheroidal surface. The sill is traversed by veins of fine-

grained basalt and contains segregations of pegmatite containing titaniferous augite crystals up to several centimetres in length. The rock characteristically has a speckled appearance caused by the presence of areas of altered analcite in the groundmass: this is a feature of all facies of the sill. Olivine-rich segregations are present and apatite is a common accessory mineral.

The sill is in the form of a sheet dipping to the west and south-west, towards Lamlash Bay. Its upper margin is transgressive towards the Permian sediments, but the lower contact is partly conformable with the sandstones which dip at between 30° and 50° SW or WSW. At Clauchlands Point there is a steep, almost vertical contact with the sediments and the sill has developed a 0.3-m-thick marginal zone of vertically flow-banded basalt. The steep margin at this point may be due to intrusion along an earlier fault.

Some way below the Clauchlands Sill there are 3 to 4-m-thick exposures of the Corrygills pitchstone sill which intrudes Permian sediments, and dips at about 30° SSW (Fig.6.11). The pitchstone is a beautiful, dark-green, glassy rock with pale streaks and bands which define flow lines. It is nearly phenocryst free, the glassy base containing microlites and delicate branching growths of crystallites (probably pyroxene and/or plagioclase) which have figured in textbooks since the early days of microscopic petrography (for example,Teall, 1888; plate 34, fig. 4). The rock is closely comparable in composition with the more silica-rich granites of the BTVP (Carmichael, 1962).

Figure 6.11: The Corrygills pitchstone sill in the cliff below the Clauchlands Sill (crinanite) at NS 050 337. Corrygills Shore site, Arran. (Photo: CJ. MacFadyen.)

Between Clauchlands Point and Corrygills Point the wave-cut sandstone platform is traversed by several dykes and sills which are only fully visible at low tide. The Mile Dyke is a prominent dolerite dyke exposed on the platform. It is between 1 and 2 m wide, trends in a NW–SE direction, and is bordered by indurated and bleached sandstone. Another pitchstone sheet, sometimes termed the Small Corrygills Pitchstone to distinguish it from the thicker one described above, crops out at the base of a thick felsite sheet exposed about 0.5 km SE of Corrygills Burn (NS 043 348). The pitchstone is about one metre in outcrop width and both it and the overlying felsite show well-defined flow-banding; the pitchstone is glassy and bottle-green in colour, whereas the felsite is distinctly spherulitic, greenish-grey rock. The sheet crosses the shore in a WNW direction and dips between 25° and 35° SSE.

Along the Corrygills shore section, which is liberally strewn with boulders of crinanite and glassy pitchstone, several other minor intrusions of basalt and quartz porphyry occur as small dykes.

Interpretation

The petrology of the Clauchlands Sill is similar to theDippin Head Sill (see below) and both are probably part of the same sill complex, together with the sills at Monamore*(c.* NS 010 298) and Kingscross Point (NS 056 284). The sills have alkali-basalt compositions and are closely similar to alkali-basalt lavas (plateau basalts) in the BTVP (Tyrrell, 1928). Tyrrell suggested that the sills were in fact the hypabyssal facies of the plateau lavas, if this correlation is correct they could be equivalent to the large, subsided masses of basalt present within the Central Igneous Complex (Ard Bheinn) and could therefore be early members of the extensive suite of Palaeocene intrusions on Arran. An early date is supported by the manner in which they are freely cut by other minor intrusions (Tyrrell, 1928, pp. 112–3). The Clauchlands sill is cut by a pitchstone dyke near Dun Dubh and the equivalent crinanite sheet on the southern end of Holy Island (NS 068 288) is cut by dolerite dykes of the NW swarm, corroborating Tyrrell's suggestion. The Clauchlands Sill is one of a group of sills and sheets which appear to dip towards a focus under the north-west part of Lamlash Bay. In addition to the crinanites at Clauchlands, Monamore and Kingscross, this group of minor intrusions includes the Corrygills Pitchstone and numerous felsite sheets, some of which are intermittently exposed on the northern slopes of the Clauchland Hills (NS 035 335), immediately west of the site.Tomkeieff (1969) tentatively correlated the sheets around Lamlash Bay and suggested that they formed part of a cone-sheet system which focused on a ‘magmatic hearth' (that is, an igneous centre) beneath Lamlash Bay (Tomkeieff, 1969, figs 3 and 4). He also suggested that the Holy Island riebeckite trachyte (NS 060 300) and the small quartz-porphyry intrusion at Dun Dubh (NS 038 343) were embryonic ring-dykes associated with the postulated Lamlash Bay igneous centre.

The essentially aphyric Corrygills Pitchstone is one of numerous pitchstones in Arran.Tyrrell (1928) divided these into four groups on the basis of mineralogy and chemistry, the Corrygills Pitchstone being one type. It is the most siliceous of the four types, has a high K2O/Na2O ratio compared with the others, and is compositionally similar to granophyre in the Arran Central Igneous Complex. It is distinguished from the Tormore–Glen Shurig type of pitchstone by its lack of plagioclase, pyroxene and fayalite phenocrysts (cf. Tormore). It could be an extreme differentiate from a tholeiitic basalt magma and must have been completely liquid when intruded and quenched against the sediments. The pitchstone magma appears to have received little in the way of crustal contributions: it has a fairly low 87Sr/86Sr ratio (0.70855 at 59 Ma, Dickin *et al.*, 1981) and also only minor amounts of lead of crustal origin (Dickin *et al.*, 1981, table 2 and fig. 7). In common with most of the Arran Palaeocene intrusions there appears to have been little alteration due to circulating heated meteoric waters (Dickin *et al.*, 1981). The principal exception to this is the altered facies of the crinanite sills, thus providing a further indication of the early position of these intrusions in the igneous sequence.

Conclusions

The Clauchlands Sill was intruded at an early stage in the Palaeocene igneous activity in Arran and may have a similar age to large masses of basalt caught up in the Arran Central Igneous Complex. Together with other alkali-dolerite (crinanite) sills near Lamlash Bay and the numerous felsite and pitchstone sheets in this area, it may form part of a cone-sheet system with a focus beneath the bay. The Corrygills Pitchstone was intruded as a nearly crystal-free magma which quenched against Permian sedimentary rocks. It probably originated as an extreme differentiate of tholeiitic basaltic magma.

Reference list

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