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## Excursion 11a: Kingscross Point, Whiting Bay, Glen Ashdale

((Figure 15), localities 1 to 15)

The objects of this excursion are to examine phenomena connected with the intrusion of the Kingscross "crinanite sheet", to study the New Red Sandstone sediments and the dykes intruded into them, and to visit composite sills of the quartz-dolerite-felsite suite.

The excursion is set out assuming a start is made at Kingscross Point, but if the tides are not favourable the exposures in Glen Ashdale may be visited first. If an approach is made from Lamlash, Kingscross Point is reached by following the road which passes Kingscross Post Office. From Whiting Bay the main road is followed to Sandbraes from where paths lead to the Point.

1. [NS 0568 2830] Here the analcime-olivine-dolerite or gabbro ("crinanite" of Tyrrell) of the Kingscross sheet and its relations to the New Red Sandstone sediments can be examined. Tyrrell (1928, pp. 116–117) gives a description of the exposures around Kingscross Point, together with a section of the intrusion and sketches of basaltic veins in the "crinanite". More recently the locality has been redescribed by Tomkeieff and Longstaff (1961). From Kingscross Point westwards the following exposures may be visited. Just west of the Point a dipping surface of coarse dolerite vanishes under shingle which is almost certainly underlain by sandstone. Some 180m farther west baked sandstone is seen to dip under and to have an intricate contact with the chilled margin of a leaf of the Kingscross intrusion, the lower part of which is relatively coarse. "Veining" of the members of the leaf by very coarse grained dolerite and by dark basalt occurs. In the vicinity of a boathouse 450m west of the Point another leaf is exposed but not on the shore. The evidence points to all leaves of the Kingscross intrusion dipping generally to the northwest at moderate angles.

2. [NS 0557 2799] South of the point and just east of the ruins of "pill-boxes" the veined dolerite referred to above should be examined closely. It will be seen that the dolerite encloses stratiform layers of a dark basalt which develop tachylitic margins against the dolerite. These layers dip generally northwestwards, i.e. in the same direction as the leaves of the intrusion already mentioned. This rock with its tachylitic edges was regarded by Tyrrell as intrusive into the crinanite and referred to the quartz-dolerite suite. Tomkeieff and Longstaff, on the other hand, considered the magmatic history to have been (*op. cit.*, p. 201):

1. The intrusion of a sheet of olivine-dolerite which passed towards the margins into olivine-basalt;
2. The intrusion into this sheet of a crinanite magma accompanied by
3. The fragmentation of the olivine-dolerite into the slab-like and shred-like fragments, which are interpreted as inclusions in the crinanite;
4. Mobilisation of the melted basalt and intrusion of the rheomorphic basalt into the adjacent crinanite, dolerite or basalt.

The base of the intrusion is seen at many points along the shore between 90 and 365 m south of Kingscross Point. The igneous rock chills against, and includes rafts and fragments of sediment (often intensely baked) and shows intricate junctions. The most southerly analcime-dolerite seen on the shore is overlain by a thin sill of quartz-dolerite.

3. [NS 0463 2729] At this point is a pit in reddish, raised beach and deltaic, sands and gravels.

4. [NS 0438 2783] Along the main road between its junction with the road to Knockankelly and Kingscross Bridge are to be seen:

1. Coarse analcime-dolerite enclosing at the south end small rafts of sandstone, and at its northern end showing a chilled surface dipping to the northwest under red drift.
2. After a stretch showing only drift deposits a dyke-like body of felsite rises through sandstone and connects with a composite felsite-quartz-dolerite sill. Locally this rests on and appears to cut an intrusion of altered olivine-dolerite.

3. A short distance south of Kingscross Bridge a typical coarse-grained analcime dolerite is seen again just above road level. This rock and that at 4(a) are parts of Tyrrell's Kingscross "crinanite" intrusion.

5. [NS 0483 2686] At this locality soft red sandstones, lying almost horizontally and showing good ripple-marks, are cut by numerous basic dykes. The latter have been examined by Rao (1959, pp. 240 *et. seq.*). He found it possible to determine the order of intrusion from the evidence afforded by intersections exposed at suitable stages of the tide. The longest dyke, striking NNW–SSE, is composed of crinanite. It cuts three tholeiite dykes which strike NW–SE and WNW–ESE. As the commoner relationship is tholeiite cutting crinanite this occurrence suggests that crinanite magma was available for intrusion on at least two occasions.

6. [NS 0467 2635] Here the more usual relationship between crinanite and tholeiite dykes may be observed. Near low-water mark a NW–SE crinanite dyke is cut by a thin NNE–SSW dyke of olivine-tholeiite (Brunton type). Rao (*op. cit.*) notes that the tholeiite dyke has developed tachylitic margins against the crinanite.

### **Glen Ashdale**

7. [NS 0326 2541] This locality is reached by the road which leaves the main road just south of the Whiting Bay Hotel and continues past the houses in the glen as a forestry track. Near the gate at the start of the forest a stream falls over the lower part of the Glen Ashdale quartz-dolerite sill. As the road is followed upwards, higher levels of the sill are exposed. At a little picnic area glacially smoothed dolerite is seen. The stream here, if followed upwards, exposes the upper felsitic facies of the sill, above which are sandy sediments which pass upwards into argillaceous (clay-rich) beds. Tyrrell (1928, p. 88) refers to this section as providing the clearest evidence that there is no stratigraphical break between the dominantly sandy lower divisions and the finer-grained upper divisions of the New Red Sandstone in Arran. Return by the forestry road towards the picnic area and take the footpath leading to the Glenashdale falls.

8. [NS 0285 2495] The Glenashdale Burn provides a good section through the greater part of the Glenashdale composite sill. Tyrrell, who estimated its thickness at 64m, has given the following generalised section:

1. Upper felsite, with intercalations of sediment;
2. Feldspathic quartz-dolerite or craignurite;
3. Main quartz-dolerite;
4. Lower felsite.

The lower felsite can be seen, with some difficulty, in a gully lying a short distance northeast of the waterfall. Here a subsidiary sill is separated from the basal member of the main sill by highly baked sandstone. The contact rock of the main sill is a banded quartz-felsite which grades upwards through granophyric felsite and feldspathic quartz-dolerite into normal dark quartz-dolerite. The face of the lower waterfall is formed by a dolerite dyke.

The main quartz-dolerite can be examined conveniently in the banks and bed of the stream for some distance upstream from the waterfall. It is a dark, medium-grained dolerite with specks of pyrites. Veins of dark basalt cut the dolerite in the bed of the stream southwest of the fall. A short distance downstream of a little waterfall, and some 37 m or so downstream from a stone wall, xenolithic dolerite appears. This occurrence has been interpreted by Tyrrell as indicating an interior contact. Upstream the quartz-dolerite is rather more feldspathic than normal, although dark and even basaltic varieties also occur.

9. [NS 0265 2480] About 90m upstream from the wall the feldspathic quartz-dolerite is followed by a slabby-jointed, deeply weathered, highly feldspathic quartz-dolerite which is succeeded by spherulitic felsite. The top of the sill is seen at a bend in the burn 128m upstream from the wall: it passes under baked sandstone above which comes a thin felsitic intrusion, the uppermost part of which is a dark-banded pitchstone-like rock.

10. [NS 0225 2486] The Baoileig composite sill is much thinner than the Glenashdale sill, its estimated maximum thickness being 12 m. The Allt Dhepin has cut a little gorge through the intrusion which can be readily seen to rest upon horizontal indurated sandstone and marl with a somewhat uneven base. The upper contact is seen at the top of the

waterfall. The sediments into which this sill has been intruded are referred by the Geological Survey (IGS) to the lower part of the Auchenhew Beds.

The Baoileig sill has been examined by Rao who has given a diagrammatic vertical section (1958, p. 278) from which the following succession has been compiled:

	metres
1. Craignurite	3.0
2. Felsite	1.5
3. Craignurite	0.3
4 Acidified quartz-dolerite	2.1
5 Fine-grained quartz-dolerite	1.2
6 Acidified quartz-dolerite	2.1
7 Felsite	0.6
8 Craignurite	1.2

The recognition of these rock types is a matter for laboratory rather than field study.

11. [NS 0252 2473] As an example of the felsite masses of the district which show no association with the more basic rock types, the Torr na Baoileig intrusion may be examined in the gorge here. Access is obtained by crossing the feature formed by the Baoileig quartz-dolerite a short distance east of the lower end of the gorge of the Baoileig Burn.

The rock is somewhat poorly preserved coarse spherulitic felsite or granophyre. Towards the south end of the gorge and on the left bank of the stream, the margin of the intrusion transgresses hardened sandstone and marl. Locally the contact rock is a pink and green banded felsite sometimes associated with a green pitchstone. The felsite and sediments are cut by a rotted basic dyke. In the face of the waterfall at the south end of the gorge the base of the Dippin "crinanite" sill can be seen to rest concordantly on the sediments. The marked feature formed by the Dippin sill should now be followed eastwards.

12. [NS 0308 2448] Here, as at other adjacent localities, it should be noted that the eroded upper surface of the alkali-dolerite stands higher than the sediments at its southern (upper) contact. A conspicuous rounded knoll lying just to the south is also of analcime-dolerite. Below the scarp of the Dippin intrusion and in the hollow between it and the eastern end of Torr na Baoileig [NS 031 244] is a WNW trending dyke of pitchstone. This dyke carries microphenocrysts of quartz, feldspar, soda-pyroxene and iron-rich olivine. Continue westwards towards locality 13 noting the continuous scarp of the Dippin sill and the higher sills of quartz-dolerite and felsite.

13. [NS 0394 2452] Just south of the prominent little felsite hill, Torr an Loisgte, a dyke of pitchstone associated with spherulitic felsite cuts the lower scarp of the Dippin sill. The latter intrusion also forms an upper feature cut by a pair of fresh tholeiite dykes and is overlain at its western end [NS 039 244] by a sill of vitreous quartz-dolerite. Downstream [NS 041 245] the lower leaf of the Dippin intrusion is cut through by a small stream giving rise to a steep cleft. Lower ground may be reached by following a track down the face of the escarpment a short distance east of the cleft.

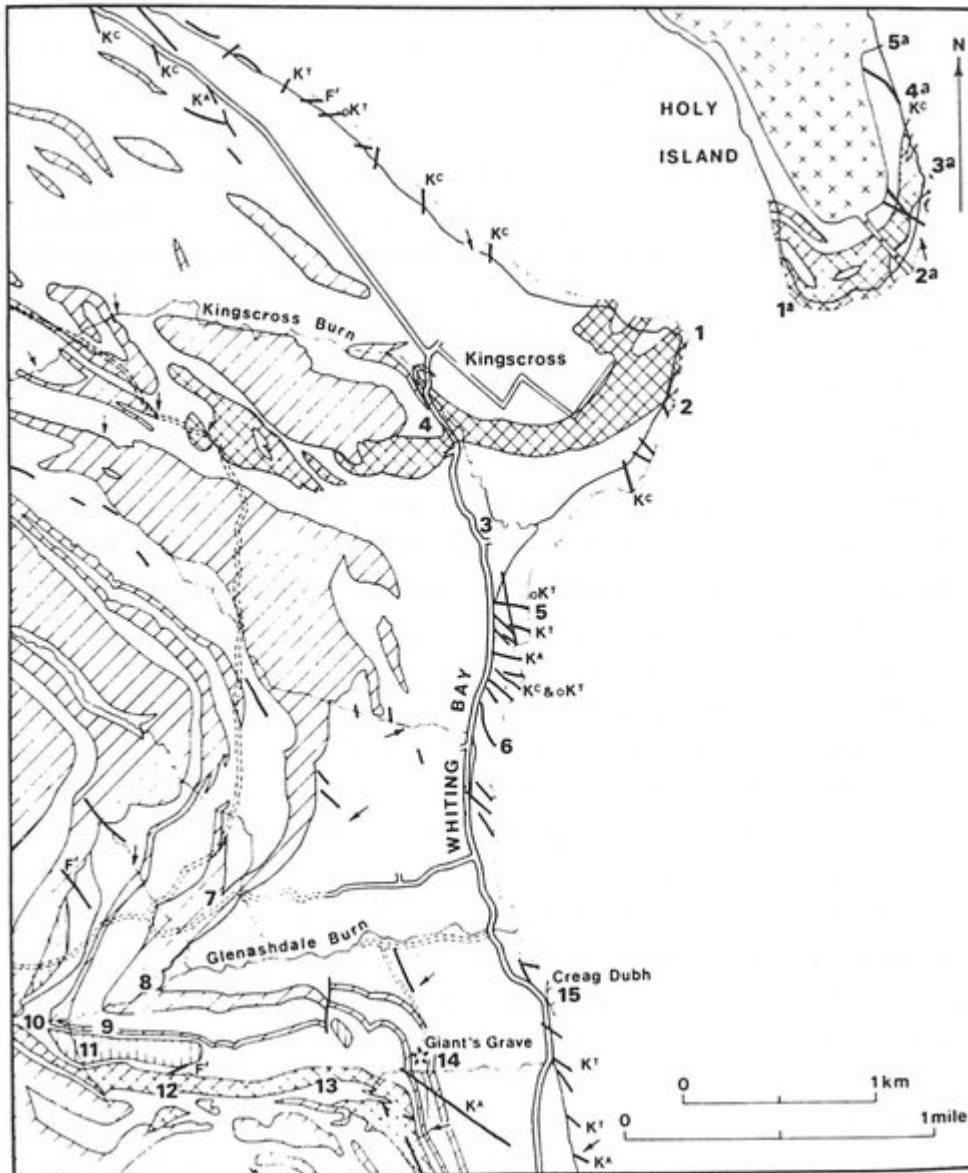
14. [NS 0436 2478] The stream issuing from the cleft should be located and followed. It provides sections of the Baoileig and Glenashdale sills and associated sediments. The first sill forms blocky outcrops of feldspathic quartz-dolerite. The second is associated with sandstones which dip steeply westwards; the intrusion appears to dip similarly. It is composite with a lower dark dolerite component and an upper banded felsite.

The imposing chambered cairn known as the Giants' Graves lies between these sills and a little north of the stream. The main road is regained by the path which runs northwards from the "graves" to the bottom of the glen and then eastwards.

15. [NS 0502 2494] Creag Dhubh (Black Rock) is a good and readily accessible composite sill. Some 8m thick it is intruded into sandstones with which its dips at about 20° to the west-southwest. It has been described by Rao (1958, p. 278) and by Rogers and Gibson (1977, pp. 1–8). A median layer of quartz-hypersthene-dolerite is flanked symmetrically by felsites. The outer members are decomposed, buff-coloured, rust-spotted rocks with little patches of green

chlorophaeite. The next rocks inwards are pale-grey feldspar-phyric felsites which have merging contacts with the median dolerite. The latter varies in coarseness and exhibits varying degrees of alteration probably due to hydrothermal activity at the time of intrusion.

## References



(Figure 15) Geological sketch-map of the Kingscross—Whiting Bay area to illustrate Excursions 11 and 11a. Note that the Triassic sediments have been left blank. Where indicated the identity of the dykes is as follows:  $K^C$  crinanite,  $K^T$  tholeiite  $OK^T$  olivine-tholeiite  $K^A$  'andesitic' quartz-dolerite,  $F$  pitchstone