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## Excursion 14 Greenock to Largs

### Key details

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Themes	Upper Old Red Sandstone and basal Carboniferous sediments: dyke swarms of three ages.
Features	Cornstones, cementstones, dykes of Lower Carboniferous, Permo-Carboniferous and Tertiary age, vent agglomerate, sill.
Maps	O.S. 1: 50 000 Sheet 63 Firth of Clyde B.G.S. 1: 63 360 Sheet 29 Rothesay 1: 50 000 Sheet 30W Greenock For walkers the coast road is essentially level but carries heavy traffic. The footpath is discontinuous, and is on the side distant from the shore exposures. There are occasional lay-bys for car users. Shore exposures are readily accessible but slippery. The inland route is almost entirely single track road: there are sufficient lay-bys for car users. The surface is good. Rough walking on moorland grass flanks the higher parts of the route. There is no public transport. The road climbs to 269 m (nearly 900 feet), and for 8 km (5 miles) there is no human habitation or shelter. About 48 km (30 miles) of driving for the round trip with short walks to the exposures. A full day excursion which can be reduced by selecting exposures of personal interest.
Terrain	If no car is available there is rail access to Largs (from the south) and to Wemyss Bay (from the north) both taking an hour from Glasgow. Between Largs and Wemyss Bay there is a bus service. No previous permission needed for access to exposures.
Distance and Time	
Access	

### Introduction

This excursion follows a circular route (Figure 14.1) by the coast road and by a moorland road, and may be taken either clockwise or anticlockwise. The coastal route affords particularly good opportunities for the study of three different dyke swarms. These are of Lower Carboniferous, Permo-Carboniferous and Tertiary age, and cut sedimentary rocks of Upper Old Red Sandstone and Lower Carboniferous age.

### Itinerary

#### Locality 1. Craigs Top, Greenock

A good vantage point from which to see the raised beaches, a large quarry in the Craigmuschet sill, and a general view of the Clyde Estuary. The Craigmuschet sill is formed of quartz-keratophyre, and contains phenocrysts of oligoclase and soda-orthoclase, together with finer quartz and felspar. In the quarry, the rock is drusy, with well developed crystals of quartz, barytes, fluorite and tourmaline.

#### Locality 2. Pier [NS 768 219]

Along the coast between Gourock and Cloch Point there is a repeated alternation of two facies: shales and cementstones alternating with calcareous sandstones, red marls and cornstones. There is thus produced an interbanding of types of sediments generally regarded as typical of the Calcareous Sandstone (Ballagan Beds) and Upper Old Red Sandstone respectively.

At M'Inroy's Point, midway between Gourock and Cloch Lighthouse, two Tertiary olivine tholeiite dykes outcrop above low water. One is xenolithic: tridymite has developed in sandstone fragments, and cordierite-buchite from shale (Herriot 1971).

The Highland Boundary Fault lies offshore, and metamorphic rocks of the Dalradian series form the Cowal hills on the opposite shore.

### **Locality 3. Spango Valley**

Spango Valley, the inland route between Greenock and the coast at Inverkip, is taken by the railway; and follows a deep valley eroded along a splay-offshoot of the Highland Boundary Fault. In spite of the marked erosion feature, there is apparently no great displacement of the rocks on each side.

From the village of Inverkip to Largs, the shore gives almost continuous exposures in the Upper Old Red Sandstone. In the 13 km (8 miles) of coast between the two places, at least 100 dykes are exposed.

During 1971, 0.8 km (0.5 mile) south of Inverkip, excavation work for a new power station opened extensive new exposures of red-brown sandstones, cut by Tertiary dykes. On the widened road section between the village and the power station site, a rock face offers fresh material in sandstone, cornstone, and in dykes and a sill-feeder of trachyte.

### **Localities 4–5. Lower Carboniferous dykes**

These are the intrusive representatives of the Clyde Plateau Lavas. While the bulk of the extrusive activity was basaltic in nature, the Misty Law-Knockside hills area [NS 295 620], ENE of Largs, was the focus of early rhyolite and trachyte eruptions, with associated vent-agglomerates and ash beds. The maximum density of occurrence of the swarm is aligned on the Misty Law centre. Though no systematic petrographic study has been made of them, they are mostly felsic or semi-felsic in type, and probably correspond to the bostonites of the Great Cumbrae. There are few basalts; the dykes typically trend ENE and average about 1.2 m (4 ft) in width. Fifty dykes of this swarm occur between Inverkip and Largs, but the maximum density of occurrence is between Knock Castle and Largs, where there are 30 in 1.6 km (1 mile) of shore. Their aggregate thickness of 34 m (115 ft) corresponds to a crustal stretch of 2 per cent.

The Permo-Carboniferous dykes of the Midland Valley and the Highlands are quartz-dolerites, and are typically solitary and thick. Two examples are encountered in this section. The first is 12 m (40 ft) in width and occurs 400 m (440 yds) south of Inverkip (Locality 4). The other is 25 m (80 ft) across, and appears through the boulder beach just south of the railway station at Wemyss Bay (Locality 5). Both have the E–W direction which typifies this swarm.

### **Locality 6 [NS 188 701]. Tertiary dykes of the Mull swarm**

Tertiary dykes of the Mull swarm, numerous in the Lorne and Cowal districts of the mainland of Argyll, extend across the Firth of Clyde and are seen on this shore section. They trend principally NW or NNW, but occasional E–W and N–S variants are present. On the promontory near Castle Wemyss (Locality 6), 13 dykes outcrop along 1.6 km (1 mile) of shore, and as many in the railway cutting alongside the main road. A triple intrusion, 11 m (35 ft) in width, occurs 400 m (440 yds) north of Castle Wemyss.

### **Locality 7. Tertiary dykes at Skelmorlie**

Tertiary dykes are also plentiful at Skelmorlie, where 19 may be counted in 1, 213 m (4, 000 ft) of shore. A striking example, 4.5 m (15 ft) in width, and crowded with fresh porphyritic feldspars is well exposed just south of the southernmost house between the main road and the sea.

### **Locality 8. Auchengarth [NS 191 645] Cementstones and agglomerate.**

Midway between Skelmorlie and Largs, the ubiquitous red sandstones are replaced over a distance of 0.8 km (0.5 mile) by Cementstone strata and by black basaltic agglomerate. The Cementstones consist of red, grey and green shales, white and lilac cementstone bands and pebbly white sandstone. They are faulted against Old Red Sandstone to the north but disappear under a boulder beach to the south. They dip at 60°–70° to the west, and have been brought down by a series of faults whose course is parallel to the coast.

The basaltic agglomerate appears to be later than the fault, and rises steeply through the Cementstone strata over a N–S distance of about 121 m (400 ft). Sparse inland exposures suggest that the vent has a roughly oval plan, 1, 200 m x 400 m (1, 320 yds x 440 yds) in extent, and elongated towards the NE. It is cut by a small trachyte mass on its southern margin, and by three dykes of the Tertiary swarm.

### **Locality 9. The Knock [NS 202 628]. Vent agglomerate**

0.8 km (0.5 mile) east of Knock Castle and 3.2 km (2 miles) north of Largs, the rising ground culminates in The Knock 217 m (715 ft) high which is formed of basaltic agglomerate infilling a roughly circular vent, 400 m (440 yds) across: Dalmeny and Dunsapie type basalts have been recognised in the component blocks. A vent intrusion of Dunsapie type basalt cuts the agglomerate.

As the north end of the town of Largs is approached, the outcrops of red-brown sandstones and the numerous and rather similarly coloured dykes, disappear below boulder-strewn beach, and rock is then only seen in the cliff backing the lowest raised beach.

### **Locality 10. The Pencil [NS 207 577]**

About a kilometre south of Largs stands the Pencil monument, commemorating the defeat of the Norsemen by the Scots at the Battle of Largs in 1263. Turn off the A78 at the access road to Largs Yacht Haven [NS 210 576] opposite the Golf Course. The road crosses the railway and there is a car park immediately on the left. From here a well-defined path leads around the small bay to The Pencil. Here, particularly at low tide, can be seen excellent exposures of Old Red Sandstone with sedimentary structures, dykes and 'sills' with baked and chilled margins, and minor faults.

From Largs there is the choice of returning to Greenock along the coast road or completing a roughly circular tour by taking the inland route. This commences from the town of Largs, about one mile from the northern end of the town. Turn off the A78 at the 'Brisbane Glen' signpost, turn left after a quarter-mile, and enter the Brisbane Glen. The scenic contrast between the western and eastern slopes of the Glen are well seen. To the west, smooth, grass-covered ground is underlain by Old Red Sandstone, rising to the volcanic vent of The Knock. To the east, downfaulted volcanic rocks of the Clyde Plateau Lavas produce rock-scarps and terraces which rise inland towards the rounded summits of Hill of Stake 522 m (1711 ft) and Misty Law, 507 m (1662 ft).

Alluvium and raised beach gravels and sand extend into the lower reaches of Brisbane Glen. At higher levels the Noddsdale Burn has cut through red till. Approaching Whittleburn Farm what may be a river terrace remnant lies to the east of the burn, but detailed mapping of the area has yet to be undertaken.

### **Locality 11. Castle Hill [NS 222 638]**

Castle Hill [NS 222 638] forms a striking conical feature just north of Tourgill Bridge. The area of its summit is insufficient to have held a fortification and it is considered to be a large exhumed basaltic erratic derived from the lava country to the

north.

## **Locality 12. Permo-Carboniferous dyke [NS 228 647]**

A quarry on the east side of the road is in one of the solitary E–W quartz dolerite dykes. It is of Permo-Carboniferous age, crosses the valley, and is cut at the Noddsdale Water by a NW Tertiary dolerite. The two dykes form the sill of a picturesque waterfall, just below a stone bridge that takes a road to the abandoned steading of East Grassyards.

Outerwards Reservoir lies athwart the Noddsdale Water and since the road here lacks passing places, care in driving is necessary for a quarter mile. An extensive lay-by is reached at the north end of the reservoir. Sections in red till are seen across the valley in two small burns.

From here there are good views of several tributary burns, notably the South Black Burn and North Black Burn, which descend the steep east side of the Brisbane Glen. Their courses are deeply incised in basic lavas and are provisionally regarded as sub-glacial chutes, which originated when the glen was still occupied by downwasting ice. The gentler slopes on the shaded western side of the glen lack any such features.

## **Locality 13**

As the road climbs to a summit at 273 metres, the watershed between the Noddsdale Water and the North Rotten Burn is passed, and a descent is made to Rottenburn Bridge. For a kilometre to the north, the burn follows the course of a N–S fault that brings basalt and mugearite lavas against Lower Carboniferous sandstones. A spectacular slot-gorge that possibly originated as a glacial meltwater channel is at [NS 2505 6985], close to an isolated ruin known as The Back of the World. About half a kilometre to the north of it, a cliff of cementstones of Ballagan Beds type forms the western bank of the burn. Since a belt of thick woodland intervenes between the road and the burn, the stream sections are best reached by walking northwards from Rottenburn Bridge, where a car can be parked.

## **Locality 14. Loch Thom is reached 1.5 km from Rottenburn Bridge**

It is an artificial stretch of water, named after the design engineer Robert Thom, who planned both it and its associated aqueducts or 'cuts' to feed the water mills of Greenock. The disused outfall aqueduct passes below the road beside Shielhill Farm. It has been replaced by a tunnel from the north end of the Loch.

At the south end of Loch Thom turn left, skirting the margin of the water, to reach Cornalees Nature Reserve centre, where turn left and descend the valley of Shielhill Glen. This is a major glacial meltwater channel, now occupied by the Kip Water. The A78 coast road is regained at Inverkip village.

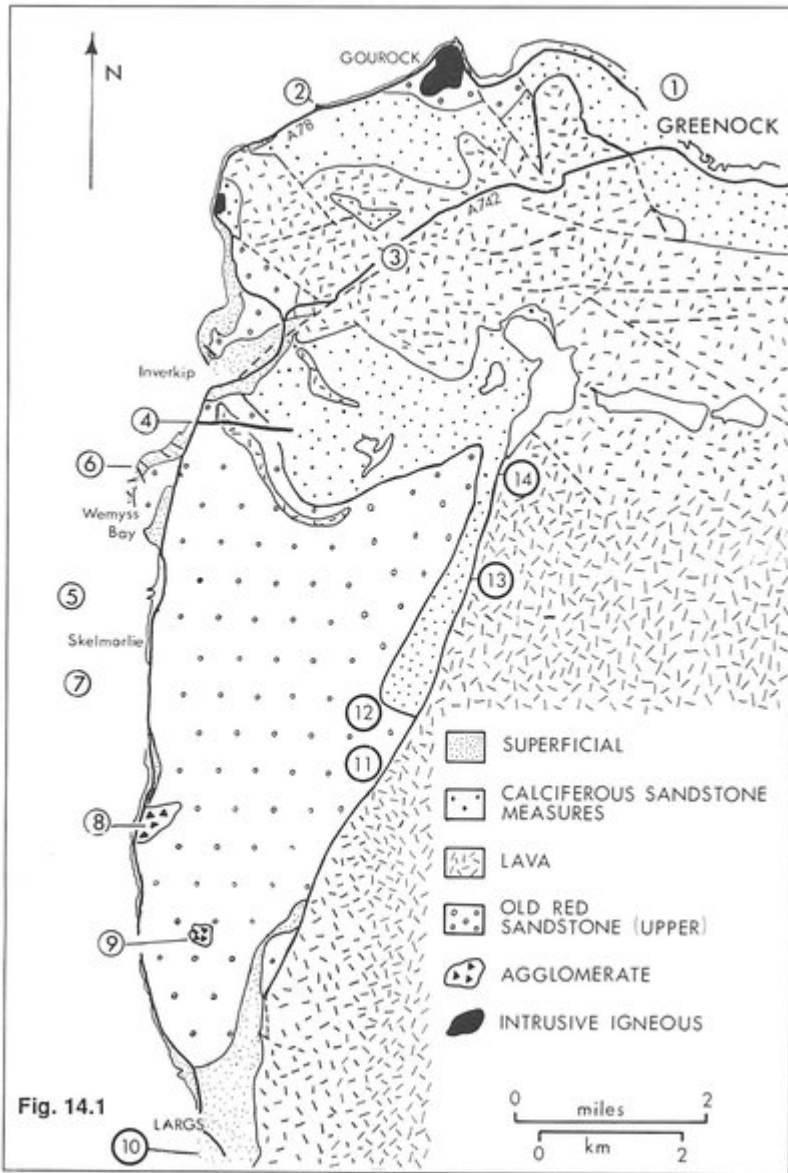
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(Figure 14.1) Geological map of the area from Greenock to Largs.