North Berwick, Yellow Craig to Cheese Bay - an excursion


Contents

- 1 Introduction
- 2 1 Yellow Craig: Vent Intrusion and Agglomerate
- 3 2. Longskelly Point: Vent and Concentric Structure
- 4 Offshore Islands
- 5 3. Longskelly Rocks: Markle Basalt and Mugearite Lavas
- 6 4. Small Intrusive Plug
- 7 5. Marine Villa: Volcanic Succession
- 8 6. Weaklaw Vent
- 9 7. Hanging Rocks: Intrusion Breccia
- 10 8. Cementstone Facies Sediments and Synclinal Ring Structure
- 11 9. Point Opposite Eyebroughy: Basalt Sill
- 12 10. Cheese Bay: Shrimp Bed
- 13 11. Cheese Bay Sill
- 14 12. Dirleton Castle: Trachyte Lava
- 15 References

Introduction

The third of three excursions that show typical examples of the volcanic and sedimentary rocks and some of the associated intrusions and volcanic vents so excellently exposed along 25 km of the North Berwick coast.

1. North Berwick to Canty Bay - covers the lower part of the sequence in descending order from the basaltic lavas to the Canty Bay Sandstone and the red cementstone facies
2. North Berwick, Tantallon to St. Baldred's - continues east to study the many agglomerate-and basalt-filled vents around Tantallon
3. Yellow Craig to Cheese Bay - going west from Yellowcraig, near Dirleton, looks at the upper
part of the sequence in ascending order, from the basaltic lavas up to the dolomitic sediments.

The rocks are Dinantian (Calciferous Sandstone Measures) in age, and belong mainly to the volcanic facies known locally as the Garleton Hills Volcanic Rocks. The general succession is (McAdam and Tulloch, 1985):

- Sediments, dolomitic, tuffaceous and cementstone facies
- Trachytic turfs and lavas - Bangley member
- Basaltic lavas-Hailes member
- Basaltic lavas-East Linton member
- Basaltic tuffs, red, North Berwick member
- (Cementstone bands, North Berwick member
- Basaltic tuffs, green, North Berwick member
- Sediments, Canty Bay Sandstone, red cementstone facies

Gentle post-Carboniferous folding and faulting has given the beds a regional dip to the west.

The volcanic succession is thinner than in the Garleton Hills to the south, though most of the lava types are represented at North Berwick. At a late stage in the volcanicity basaltic and basanitic sills and dykes and phonolitic volcanic plugs were intruded into these rocks. Another feature of the volcanicity is the number of tuff and agglomerate-filled volcanic vents. These were first identified as vents by Cuthbert Day, a local geologist and geochemist, who in a series of papers described the geology of the whole North Berwick coast section. The vents and their relationship were further discussed by Martin (1955) and more recently by Leys (1982). Descriptions of deep-originating granulite blocks have been given by Graham and Upton (1978).

![North Berwick to Canty Bay excursion map.](image)

### 1 Yellow Craig: Vent Intrusion and Agglomerate

The excursion starts from the Yellowcraig car park (NT 516 854). Take the path eastwards through
the plantation and climb the small hill of Yellow Craig which forms a roche moutonnee. The Craig is a plug, lying within the Yellow Craig Vent, consisting of hard, black microporphyritic olivine-basalt. Surrounding Yellow Craig the extensive flat at about 8 m O.D. is a post-Glacial raised beach, covered in places by dunes of blown sand. East across a wall are several low outcrops of the vent agglomerate, a brown-grey tuff full of rounded bombs and baked angular blocks. Careful study will show they include Markle basalt, mugearite, bedded tuff, mudstone, siltstone, and large blocks of microporphyritic basalt seen at Yellow Craig. Small and rather vulnerable outcrops such as these should be treated with care and not hammered. Ample opportunity will occur for collecting from the large foreshore outcrop at the next locality.

2. Longskelly Point: Vent and Concentric Structure

Proceed due north across low sand dunes and the beach sand to the wave-cut platform of Longskelly Point. The east end of this platform is an intrusive sheet of black microporphyritic olivine-basalt. In the absence of contacts it is not clear whether the sheet was intruded entirely within the vent or extended into the flanks of the volcano. Note the prominent jointing and poorly formed columns in the hard, fissile basalt. Towards the west end of the wave-cut platform there occurs a concentric structure lying within the vent, possibly caused by collapse. Standing on the basalt plug some 25 m across in the centre of this structure, one can see concentric ridges and hollows formed by alternating hard basalt and soft agglomerate. Here also the greenish vent agglomerate contains fragments of various lithologies. The vent margin lies along a curved hollow where vent agglomerate cuts across Markle basalt lava the lava distinguished by its numerous large feldspar phenocrysts.

Offshore Islands

At this point it is worth pausing to look at the four islands which enhance this coastline. Lying just offshore, Fidra is a thick sill of microporphyritic olivine-basalt, note the fine columnar structure in the basalt, the natural arch on the far side, and the low raised beach and cave on the near side. To the east the rocky Lamb is probably part of the same columnar basalt sill. Further east still, the rounded Craigleith is an essexite laccolith, and the vertical-cliffed Bass Rock is a phonolite volcanic plug. Also prominent to the south-cast is another phonolitic plug forming the conical North Berwick Law.

3. Longskelly Rocks: Markle Basalt and Mugearite Lavas

For the next 800 m the rocks on the foreshore consist of Markle basalt lava, dipping gently to the south. Round the point opposite Fidra, the junction between Markle basalt and the overlying mugearite lava to the south can be traced near H.W.M. Contrast the angular appearance of the grey, fissile, non-porphyritic mugearite with the rounded appearance of the darker grey, crumbly Markle basalt containing numerous large feldspar and small olivine phenocrysts. The upper part of the basalt lava is autobrecciated and has amygdales and calcite veins. The high level of the wave-cut platform suggests formation during a higher post-Glacial sea level rather than at present.

4. Small Intrusive Plug

Located below a 'Power Cable' sign is a neat oval plug of hard black basalt. 5 m by 10 m. intruded into Markle basalt lava. The intrusion has a pale chilled margin which can be traced along the somewhat irregular contact with the lava.

5. Marine Villa: Volcanic Succession

Towards Marine Villa, due to a change of strike, the volcanic succession of Markle basalt, mugearite
and trachytic tuff is traversed in ascending order. Here the mugearite lava is very well exposed, and in it can be seen sparse feldspar phenocrysts, concentric iron-banding with bleached centres, and numerous calcite veins. Note here also the storm beaches of black microporphyritic basalt boulders, brought by currents across from Fidra; during exceptionally low tides the connecting Brigs of Fidra may be exposed. Opposite Marine Villa, used by R. L. Stevenson as the location for his short novel The Pavilion on the Links, the junction of mugearite lava and overlying red bedded trachytic tuff is repeatedly exposed by a combination of low dip, slight folding and irregular erosion. The irregular slaggy amygdaloidal top of the lava has been preserved here by the overlying tuff. The absence of a bole of red fossil soil indicates that the tuffs were deposited soon after the lava. Sections of the trachytic tuffs in low cliffs show alternation of coarse and fine bands and an agglomeratic base. Slickensided planes with slight movement are indications of the faulting occurring further west.

6. Weaklaw Vent

Just beyond a second 'Power Cable' sign the red bedded tuffs are truncated along a silicified plane, dipping at 30 degrees to the west, well-exposed at H.W.M. and in the low cliffs behind. This is taken as the edge of a small vent, about 100 m across, filled with reddish-brown poorly bedded sandy tuffaceous breccia containing grey cementstone blocks. Along H.W.M. beyond the vent arc exposures of soft, yellow, bedded dolomitic tuffs containing blocks of trachyte, some markedly feldspar-phyric.

7. Hanging Rocks: Intrusion Breccia

Intruded along a NE-SW fault separating the trachytic tuffs from cementstone facies sediments is a yellow dolomitic breccia with large hornfelsed shale blocks. The south-east margin of this intrusion breccia is spectacularly displayed in two bluffs as planes dipping at 60 degrees and 45 degrees, which leave the breccia 'hanging' against the bedded volcanic rocks in the cliffs behind. By the caves in the next bluff, 5 m of rotten, purple, vesicular, porphyritic trachyte lava with an irregular base rest on 8 m of purple and cream, bedded trachytic tuff with agglomeratic bands.

8. Cementstone Facies Sediments and Synclinal Ring Structure

From the slopes above the caves there are fine views of gentle folding in bedded sediments on the foreshore. Close examination on descending to the shore shows that these are cementstone facies sediments, consisting of thin red-weathering, grey cementstones, some nodular, grey siltstones and mudstones, in which plant fragments and rarely shells may be found. Minor folding and faulting can be discovered within the larger structures. Just to the west, and separated from the sediments by a fault, there is an asymmetric synclinal structure, possibly caused by collapse. Prominent hard dolomitic bands alternating with softer tuffaceous bands pick out dips of up to 40° in the structure.

9. Point Opposite Eyebroughy: Basalt Sill

A thin irregular sill of microporphyritic basalt has been intruded into dolomitic and tuffaceous sediments. The sill, cut by erosion into several parts, displays fine columnar structures varying from horizontal to vertical. Eyebroughy, a rocky tidal islet, consists of trachyte, thought to be intrusive.

10. Cheese Bay: Shrimp Bed

In the bay to the south, which reputedly owes its name to the wreck of a ship laden with cheese, gently folded sediments crop out. A band of hard red-weathering cementstone with estheriids is underlain by dark grey mudstones, black bituminous shales containing ostracods, fish scales and pyritised plants, finely colour-banded shales, and a thin fissile grey silty cementstone. This locality is
noted for the occurrence of the shrimp *Tealliocaris woodwardi*, which is particularly abundant in the thin silty cementstone. A list of the numerous species of fish and plants also collected from these beds is given by Clough (1910. p. 207). More recent studies on this locality have been done by Hesselbo and Trewin (1984). Over-collection has obscured the richest beds, but fine specimens of shrimps may be obtained by splitting fragments on the beach.

11. Cheese Bay Sill

Just to the south another microporphyritic basalt sill is similarly intruded into dolomitic sediments. In the bouldery area beyond, prominent isolated stacks of basalt capped by outliers of baked sediments show the development of white trap, druses and other phenomena produced by intrusion of basaltic magma into carbonate rocks. The excursion can be completed by continuing south to Gullane (3 km) from where a service bus goes to Edinburgh, or by returning along the shore to Yellowcraig (4 km).

12. Dirleton Castle: Trachyte Lava

Worthy of a visit in Dirleton Village is the ruined castle built in the 13th to 15th century. The castle (NT 516 839), open all year, is sited on a trachyte crag. The red-purple stained, fine-grained trachyte lava has white feldspar phenocrysts and is typical of the trachyte lavas which form a thick pile in the Garleton Hills, but are represented on the coast only by the lava at Hanging Rocks. The return journey takes one through the charming villages of Gullane, Aberlady and Longniddry to Edinburgh.

References


At all times follow: The Scottish Access Code and Code of conduct for geological field work

Retrieved from ‘http://earthwise.bgs.ac.uk/index.php?title=North_Berwick,_Yellow_Craig_to_Cheese_Bay_-_an_excur­sion&oldid=23237’

Category:

- 5. Midland Valley of Scotland

Navigation menu

Personal tools

- Not logged in
- Talk
- Contributions