
Coldingham

O.S. 1:50 000 Sheet 67 Duns and Dunbar

B.G.S. 1:50 000 Sheet 34 Eyemouth Solid and Drift

The Silurian rocks which crop out around Coldingham differ in character from those seen to north-west, as at Fast Castle, and to south-east, near Eyemouth (Greig 1988). The main object of this excursion is the examination of these rocks on the shore. Fluvioglacial deposits and drainage developments in the area are also worth examining.

The village of Coldingham, of ecclesiastical importance in mediaeval times, lies about 2 km south-west of St Abbs on the A1107 Cockburnspath to Eyemouth road. From the centre of the village [NT 902 660] the road to the Sands should be taken, at first to the left, and after about 500 m turning off to the right. Cars may be parked in the centre of the village or close to the Sands, about 1 km beyond. Prior enquiry should be made locally regarding the parking of coaches.

The excursion begins at the village car park. If transport arrangements allow it may be ended there or alternatively at Fleurs, Hallydown, or Eyemouth. Approximate distances are

- Coldingham to Callercove Point 1.5 km (road) plus 2.5 km (rocky shore and path)
- Callercove Point to Fleurs 1 km (rocky shore and path) plus 1 km field track)
- Callercove Point to Hallydown 1.5 km (field track)
- Callercove Point to Eyemouth 2.5 km (field track and road)

The exposures beyond Milldown Point are mainly on a broad foreshore lying well below H.W.M.

1. Milldown Burn: Glacial deposition

Follow the road from the car park towards the Sands. The Milldown Burn, which is crossed at the foot of the village, carries the water of several significant streams draining the moorland from a watershed 4 or 5 km north-west of Coldingham. At an early stage in the deglaciation of the area the sources of its water may have lain far to the north-west, beyond the present major watershed close to the Dowlaw farm road (p. 24). The dissected rounded terrain which lies to the north of the burn, from Applincross to the cliff-tops as far north as St Abb's Haven Hotel, is formed by fluviglacial sand brought down by these streams. The sinuous rounded channels within the area are due to erosion by streams of the same period. The best exposures are at the beach car park, an old sand-pit, and behind the hotel, across the road, where about 4.5 m of cross-bedded sand and fine gravel have been seen. The Milldown Burn has been diverted southwards by its own abundant deposits of sand, and has cut a narrow gorge through greywackes from Milldown Cottages to the sea.

2. St Abbs Haven: Volcanic vent

Follow the footpath to the beach and examine the rocks at the northern end of the Sands. In this area lies the NE-trending fault which separates the Lower Devonian volcanic vent of St Abbs from the Silurian greywackes to the south, the Coldingham Beds. The rocks of the vent are an assemblage of intrusive porphyrite and volcanic agglomerate, all fine-grained lithologies and somewhat reddened, like the greywackes, and not always readily distinguishable from them in the field. A helpful characteristic of the igneous rocks is the occurrence of phenocrysts of ferro-magnesian minerals, altered to iron oxides, visible under the hand-lens.

3. Milldown Point: Coldingham Beds

Towards the south end of the Sands the greywackes are less reddened and their stratification is evident. In the extreme corner of the Sands, west of a N-S fault which passes 15 m west of a short set of steps, they are cut by two sill-like

microdioritic intrusions separated by 1.5 m of greywacke. The more northerly is 5 m thick, includes many irregular xenoliths of contorted sediment, and locally interdigitates with the greywacke; the more southerly sill is at least 3 m thick. Homeli Knoll, the conical hill above, marks the seaward limit of the fluvio-glacial sands described above, and a narrow strip of blown sand is seen to north-west, along the back of the beach.

The greywackes at the southern end of the Sands are cut by several N–S and E–W faults. The thin beds dip generally at 50° to north or NNW, but many small folds are clearly visible, plunging at various angles, locally steeply, and in several different directions. No clear pattern is immediately apparent. Eastward, on Milldown Point, the greywackes are intruded by a very pale yellow close-jointed felsite, approximately concordant and extensively altered to carbonate and sericite. The intrusion can be followed south-westward from Milldown Point for 150 m, to the left bank of the Milldown Burn near its mouth, its width varying from 6 m on the point to 2 m beside the burn and up to 17 m nearby. The margins of this intrusion follow the intricacies of the bedding, either because the two rock-types have been folded together or because the magma has been preferentially intruded along already folded bedding-planes. Shiells and Dearman (1963, 1966) postulated that the Coldingham Beds, and the intrusion, might be pre-Silurian but subsequent structural and metamorphic studies (Oliver et al. 1984) suggest that the greywackes are of late Silurian age and that large-scale slumping caused the complex folding prior to complete lithification. Radiometric dating shows the Milldown Point intrusion was emplaced at or before 398±13 Ma. (Greig 1988, p.30). It is thus essentially coeval with the various 'Caledonian' intrusive swarms of wide occurrence in the south of Scotland. Particularly striking examples of the complex folding of the greywackes are to be seen immediately east of the Milldown Point intrusion.

From the mouth of Milldown Burn cross the pebble beach and follow the path up the cliff to south-east and then descend again to the shore level after rounding Yellow Craig Head. From here to Linkim Well the complexities of folding may be examined at many points; notable features include closely-spaced, flat-lying, tight similar folds and concentric folds showing extreme variation in angle of plunge. Discordance between adjacent folds and discontinuity of bedding are common, and there is a significant absence of cleavage associated with the folds. All these features support the hypothesis of soft-sediment deformation resulting from gravity-induced slump movement.

4. Linkim Shore: intrusions

Linkim Shore, which is backed by a storm-beach grading into a low raised beach, the rounded stack known as Leader Kip stands up prominently from the rocky intertidal 'platform'. It forms part of a NE–SW trending dyke of closely jointed pale microdiorite similar to that of Milldown Point (Shiells and Dearman, 1963). The Geological Survey map groups it with the quartz-porphyrines but in places it is more even-grained and albitic. The dyke's boundary with the greywackes is locally obscure but it appears to vary in width between 40 and 100 m with a 60 m wide offshoot, exposed at L.W.M. just to north.

Near the south-eastern end of Linkim Shore two sill-like intrusions less than 1 m wide cut the greywackes, which in this area are more regularly folded, with N–S trending hinges and steeply dipping limbs. The more westerly sill, which extends northwards from a wider somewhat circular outcrop, has small phenocrysts of plagioclase and mica. The second sill, 30 m to the east, is 0.6 m wide and follows bedding in the greywackes around the axis of an asymmetric anticline. This observation is more plausibly interpreted as an instance of the intrusion following folded strata, rather than subsequent folding of the intruded rock.

5. Bennison's Brae: Linkim Beds

This name is given to the 30-m cliff which forms the right bank of the Fleurs-Hallydown Dean at its mouth. From the west the red colour of the rocks is very striking, and close examination shows that the burn runs very close to the boundary between the highly contorted Coldingham Beds to north-west and an apparently less deformed group of massive red greywackes and siltstones, the Linkim Beds to south-east. The name is taken from Linkim Kip and the formation lies entirely outwith Linkim Shore. Among the well-exposed rocks on the foreshore east of the mouth of the burn the precise boundary between the two formations is difficult to trace, but it may be marked by an irregular intrusion of feldspar-porphry. The beds to the west of this intrusion, although reddened, show in places the isoclinal folding typical of

the Coldingham Beds and not generally seen in the Linkim Beds. From general considerations the boundary is thought to be essentially a NE–SW fault with downthrow to NW. The Linkim Beds are characteristically red or purplish and consist of alternating bands of greywacke and siltstone, which are in general thicker than those of the Coldingham Beds but seldom exceed 0.6 m. The greywackes lack the extensive development of carbonate which distinguishes the Coldingham Beds and are, in some cases at least, rich in quartz grains. The greywackes at the foot of the Bennison's Brae cliff have a massive appearance and their structure is not readily apparent, but at localities 80 m and 120 m beyond the south-eastward bend in the cliff-line, minor folds are developed in thin strata on the shore. At the second locality two folds about 6 m apart occur in beds dipping generally to north and north-west. The more northerly is an antiform plunging at about 20° to north-east. Other examples of folds of this type and on this scale are common farther to south-east. Just north-west of the two folds the greywackes are cut by a 7.5 m-wide dyke, which can be followed north-eastwards across the shore, and south-westwards and westwards into the cliff, along the face of which it is exposed for a further 50 m to south-east. Described as an altered quartz-diorite, this dyke is among the more acid of the Lower Devonian suite and it may be continuous with a similar 20 m dyke seen north-east of Linkim Kip.

6. Linkim Kip: Linkim Beds, porphyrite intrusions

Within the shore outcrop of the Linkim Beds the stack known as Linkim Kip is the most prominent topographic feature. On its triangular western face the stratification is clearly seen, dipping to north-north-west at 30°, conspicuously modified by two closely spaced folds similar in style to those seen on the shore to west. The beds round the base of the stack yield sufficient evidence of grading and cross-lamination to show that they are inverted. Evidence of this type at other exposures indicates that, except at the south-eastern end of the outcrop, the Linkim Beds are in general inverted and that the minor folds face downwards, the beds in the cores of synforms, for example, being older than those farther out on the fold limbs. A graptolite collected near Linkim Kip, poorly preserved and doubtfully allocated to the genus *Monograptus*, indicates a probable Silurian age for the rocks (Strachan, 1982). More recent work by Molyneux (1987) has shown that beds at the base of the stack contain an assemblage of microscopic acritarchs comparable with that found elsewhere in the lower part of the Wenlock Series.

Along the northern edge of Linkim Kip, and extending for 150 m to east, are several thick bifurcating dykes of altered porphyrite, separated locally by a screen of greywacke from the 20-m quartz-diorite mentioned above. The foreshore south-east of Linkim Kip affords many other examples of minor intrusions of porphyrite, and small-scale folds, mainly in close pairs like those described above, are also widespread. One fold-pair 75 m south-east of the stack, developed in beds dipping generally northwards, has an S-shaped aspect as seen from the south. The median limb, which dips eastward at 35°, is followed by a slightly discordant thin intrusion, whilst the axial region of the lower fold, an anticline, is in part faulted. About 70 m farther to south-west two intrusions both 5 to 8 m wide appear to 'plunge' eastwards beneath the greywackes. Some 30 m to east a Z-shaped fold-pair is developed in the eastward-dipping greywackes, and can be followed to ESE for 80 m. The median limb is 3 m long and is vertical. The SE axial plunge steepens in that direction to 35°, the folds converging, becoming sharper, and ultimately dying out. From this point southwards ramifying dykes of porphyrite become more common, trending generally between east and north-east. The most northerly, 6 m wide, is sinistrally displaced by a NNE fault 10 m below H.W.M., and 20 m farther to east gives rise to a 1.5-m apophysis which persists south-westwards for 50 m.

7. Callercove Point: volcanic vent

Some 60 m south-east of the wrench-fault just noted a 0.5-m porphyrite dyke is exposed near H.W.M. Followed eastward for 50 m, it merges with a thicker dyke which is linked eastward by another thin intrusion to a sinuous, bifurcating, and faulted dyke up to 10 m wide which trends NE for 150 m from H.W.M. Just north of this group of dykes, 40 m out from H.W.M., an exposure offers a clear demonstration of downward-facing folds in thin greywackes. Four folds are seen here within a 3-m zone, their axial planes dipping steeply eastward, approximately parallel to the general dip of the strata. The axial plunge is northward at 30°. Within the folds the grading of sediment in certain beds, and the local development of tongue-like flame-structures of siltstone into the base of the succeeding greywacke, show that the beds in the cores of the antiforms are younger than those in the fold limbs, i.e. the antiforms are synclines. Folds of this type are also displayed near H.W.M. 50 m to south and beyond the thick dyke, some 120 m to the east. Elsewhere in this vicinity

flute-casts and groove-casts are, for the Linkim Beds, exceptionally well developed and confirm the general inversion.

The north-west-facing cliff at the end of the beach is made up largely of intrusive porphyrite, but with a complex interrelationship between greywacke and breccia. At the most westerly promontory uninverted greywacke-bedding locally steepens against a vertical fault at the margin of a breccia made up of angular clasts of greywacke. This exposure marks the northern end of a narrow outcrop 50 m long, bounded on all sides by intrusive porphyrite but within 10 m of the northern and western limits of that lithology. South-westwards, towards the gully, the breccia is more extensive on the cliff-face, and within the gully it interdigitates with the greywacke, from which it appears to have developed by upward transition. All the rocks for some distance to southeast lie within a volcanic vent (Eyemouth Excursion locality 1), similar to the rocks seen at St Abbs Haven (locality 2). It may well be that the formation of the breccia at Callercove Point involved shattering of the greywacke by volcanic forces. From Callercove Point the excursion may be concluded by returning to Coldingham along the shore or by field-tracks via Hallydown or Fleurs, or by continuing by field-tracks to Eyemouth.

[References](#)