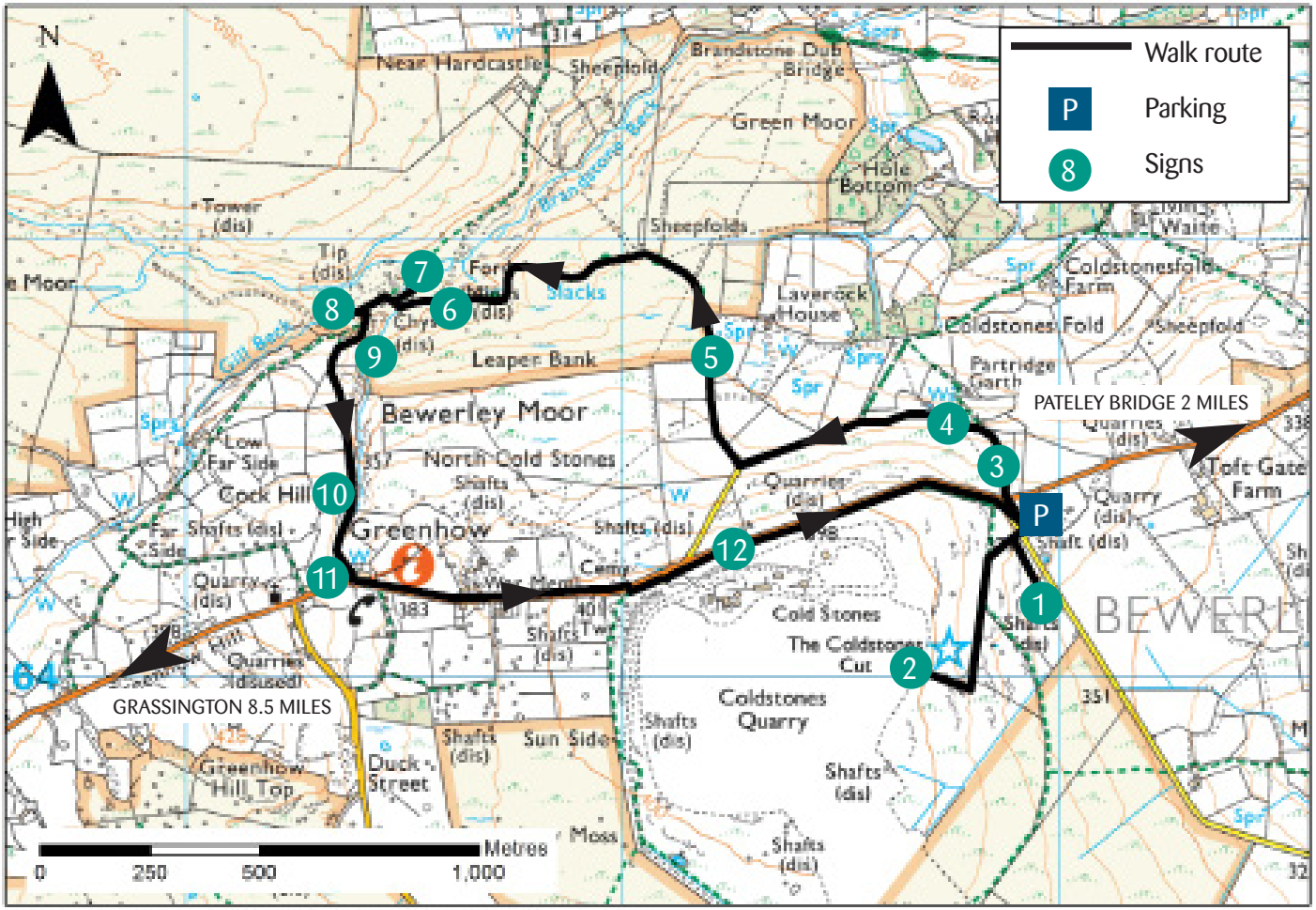
Greenhow Geology Trail, Greenhow

Nidderdale
Area of Outstanding Natural Beauty

Introduction

This walk will take you on a journey back in time from the present day, to the Ice Age, then to tropical conditions 300-350 million years ago where you can discover fossils from the tropical seas and forests. You can look down 100m into the inside of the hill from the Coldstones Cut and then drop right down into the valley where you see the impact of man's search for lead and fluorspar. You can also look for crystals of your own in the material the miners threw away as waste, before climbing back up the hill to the mining village of Greenhow where again the geology has been greatly disturbed by the miners. In fine weather the last section gives good views across Nidderdale and looks at the remnants of the local lime producing industry.



Map

OS Explorer 298: Nidderdale

Distance/Time

3.5 miles (5km)
2-3 hours

Starting Point

The walk begins from Toft Gate car park at Greenhow. Grid ref SE129644.

Terrain

This is a moderate route which follows rough footpaths so hiking boots/ strong shoes are advisable.

Useful Information

- This walk is mostly above 300 metres and may take you 2-3 hours if you stop to explore the geology.
- Please be aware that weather conditions can change and that the temperature here is often several degrees cooler than in Pateley Bridge. Warm, waterproof clothing is recommended.
- DANGER: Keep away from old shafts or workings, these may be in a dangerous condition and could collapse.

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The route

The trail is marked by special signs that fold down into a post when not in use, so are not intrusive in the rural landscape. There are two exceptions; Sign 2 at the Coldstones Cut viewpoint is of a more traditional form, as is Sign 11.

From the car park follow the footpath towards the Coldstones Cut, turning left at the sign just through the gate towards a small gateway in the stone wall. Beyond this is **SIGN 1** at the top of a small quarry in glacial gravel, this is one of the deposits left by the glaciers.

Retrace your steps to the main footpath and climb up to the Coldstones Cut viewpoint. From **SIGN 2** you can see that quarrying has exposed the rocks in the centre of the hill. Here you can also see where the glacial sediments have penetrated deep into the Carboniferous limestone and the information boards describe the formation of the rocks in the quarry itself and the mineral veins which cross it.

From the Coldstones Cut walk back down the hill, look out for the imprint of a fossil tree fern in one of the sandstone boulders at the bottom of the track.

Cross the minor road and go back through the car park. Cross the B6265, looking out for traffic, and climb the stile at the side of the gate, again look for another imprint of a fossil tree fern in a sandstone block on the stile. **SIGN 3** describes the environment these tree ferns grew in, a similar species of tree fern can be found in Australia today.

The limestone both at Toft Gate (where you parked) and here, beneath the grass, is very close to the surface and can be seen in some places alongside, and in the track, as you descend the hill.

After following the dip of the limestone downhill, the track turns to the left and you should be able to find limestone with crinoids in the small exposures cut for wall stone and stone for the track. **SIGN 4** shows modern survivors of this species. The track itself is now following the top edge of the limestone and, over the wall, are sandstones. Look out for the sandstone blocks in the wall which shows that sandstone bedrock is very close by.

The delta, which fanned out over the limestone, consisted of pebbles, coarser sands, finer sands and muds. These consolidated to form repeated sequences of gritstones, sandstones, and mudstones. Gritstone is a local name for a very coarse sandstone often containing pebbles.

The finer grained mudstone is commonly called shale. These sediments built up in layers, the sandstone and gritstone generally being permeable and the compact shale being impermeable. This characteristic means that where shale occurs at the surface the ground is often badly drained.

Where the track meets the road, turn to the right and look for the areas of boggy ground which have developed on the shale layers. Just after the stile and gate, look to the left where a small drain has exposed a coarse grained gritstone with small pebbles, **SIGN 5**. Follow the track downhill again looking out for the boggy flatter areas.

At **SIGN 6**, looking downstream, you can see the shale beds exposed above Brandstone Beck where they have been cut through by fast flowing melt water streams to form a deep valley. A small sandstone bed can be seen above the shale. This is also a good viewpoint to see the huge tips of mining waste that now fill the base of the valley. The coarser gritstone above the waste was quarried by the miners for buildings and to support the weaker ground at the mine entrances.

As you follow the track to **SIGN 7** you can see the stone lined entrance of an old lead mine, (Gillfield Level), is close to another pile of mining waste. You can still find fragments of minerals on these heaps.

As you walk from Gillfield Level along the path you are walking through the remains of several periods of ore processing and smelting. In the late 18th century there were two smelt mills here, one for Gillfield Level and the other for Cockhill Level, (near **SIGN 8**), further up the path. In later years both levels were operated by the same company and used a single mill.

On your right (near the bridge) is a pile of slag from the last smelt mill and further on to the left a flue led up to a chimney on the hill.

As you follow the path upwards, below you to the right, are the remains of bouse teams' which once housed the ore waiting for the smelter.

Follow the path to **SIGN 8**, and, if the season is right, look for the flowers that are special in this area. Mountain pansy and thyme are limestone plants and leadwort thrives on lead mining waste where other plants die.

Cockhill Level was the main horse level in the area and its tunnels led into about 10 miles of interconnected passages. You might want to walk on the huge pile of waste to your right to get an impression of the amount of material that was moved by the miners in their quest for lead.

The route continued

Follow the track above Cockhill Level to a marker post, turn left up the hill towards another marker post above you. From here walk to **SIGN 9**, which looks back on Jack Ass Level, one of the earliest mining tunnels in the area.

Follow the markers to where the paths cross and re-join the main path at the top of the hill. Looking back towards Jack Ass Level, the Red Scar Grit beds dip along the flank of an anticline (up fold) and by your feet are shale beds disturbed by rabbits. Close examination of the shale beds shows that these are dipping in the same manner as the Red Scar Grit.

As you walk up the hill you pass back onto the gritstone which can be seen in several places. As you climb over the stile you can see that the material used to build the walls here is all gritstone and sandstone.

Walk up hill to where a large shaft can clearly be seen on the left alongside the track. This large shaft is the first shaft on Waterhole Vein and the size of the tips surrounding it indicate the considerable depth of the shaft.

Carry on up the path and through the gate, then walk up the hill on the right to **SIGN 10** and look at the line of shafts to the east and west along Waterhole Vein.

Follow the path up hill and just before the main road, look to the right. Here, in the garden of Kipling Cottage, is the stone housing of an old well. The well took water from the Grassington Grit aquifer, which is contained by the impermeable Nidderdale Shales below. There was a reluctance to drink from this well due to it being downhill from the cemetery!

Just before the gate **SIGN 11** shows information about Greenhow itself and the stone used for building.

Turn left at the road and follow the path on the left side of the road. As you walk along the road note the line of shafts running across the fields to the left and another complex of mine shafts across the road on the right. These shafts provided haulage routes and access to the many veins mined from Cockhill Level.

The walls give an indication of the stone close to the surface and as you walk up the road note the change from gritstone to limestone walling just before the graveyard. The limestone walls behind the graveyard and continue along the roadside after it. This limestone is similar to that seen at Toft Gate near the beginning of the walk, with relatively thin beds. You might be able to spot some crinoids in the walls as you walk past, but please do not remove any stones.

The wall stone of the 'new' graveyard is, however, a cut, coarse grained gritstone probably brought from the quarries in Peat Lane or Pateley Bridge in 1895 when the graveyard was founded.

Just after the graveyard the large shaft to the left and another to the right of the road, mark where Sun Vein passes below the road. This vein was mined from Gillfield Level at its northern end and by a meandering route from Cockhill Level, along different veins, until it reached Sun Vein at the southern side of the quarry. A steam engine was used here to pump water out of the lower levels to allow the mine to be deepened. Sun Vein was a very productive vein and is visible from the Coldstones Cut viewpoint where it runs through the quarry.

Cross the road just after the water tower and go through a metal gate, turning left along the quarry perimeter so you can continue the walk keeping out of the path of traffic.

Continue across the quarry entrance and follow the path to **SIGN 12**, near an old lime kiln on the right. The first limestone quarry here was for the production of lime, this kiln may date back to 1800. The aerial photo on the sign shows the area in the 1970s; note the remains of mineral workings to the west of the quarry.

As you walk back to the start of the route, on a good day, you can look at the vista to your left. Here, hard beds of sandstone can be seen in places forming small cliffs along the edge of the hillside and, in Ashfoldside Gill, the distant mine workings and mine waste tips on Prosperous and Providence Vein stand out where the vegetation has not yet recovered. Flat, reedy, almost level, terraces can be seen where shale lies close to the surface and distant heather moorlands form where peat lies on acidic sandstones.

If you still have energy to spare you can explore the unique lime kiln by the car park. You will be able to see more of the Toft Gate Limestone (with crinoids) which was quarried here for making lime.

The geological background

The hard rocks of Greenhow are all Carboniferous in age and were formed 300-350 million years ago in a tropical environment. The limestone which formed in the reef bounded sea, is more than 100m thick and this depth can be seen from the viewpoint at the Coldstones Cut.

The thin beds of shale at the top of the limestone indicate that mud was being washed off the land. Above the limestone are beds of sandstone and shale followed by a return to limestone. This top limestone is distinctive, being formed mainly of fragments of fossil crinoids, and was again followed by the deposition of sandstones and shales.

These sandstones and shales represent sediments washed into a huge delta which eventually covered most of Yorkshire. The river which fed it must have been of a similar size to the Mississippi today, and carried large volumes of mud and sand from a land area to the north.

Millions of years followed these events and the climate changed as the land was moved slowly north by the effects of plate tectonics and continental drift. Sediments from the following eras were deposited on top of those we see today but subsequent earth movements, followed by millions of years of erosion removed these younger rocks and exposed the Carboniferous sequence that had been buried deep below them. These earth movements created fractures which allowed the penetration of mineralising fluids and the crystallisation of vein minerals in cracks in the rocks.

In the more recent geological past, approximately 2.5 million years ago, this area cooled sufficiently for glacial ice sheets to form. These were not continuous but advanced and retreated for more than 2 million years with some periods between the glaciations being warmer than the climate in Yorkshire today.