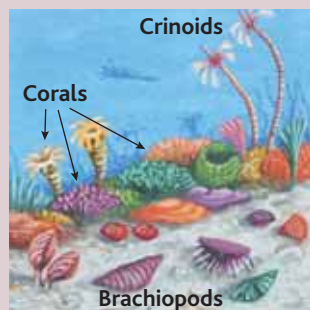


ROCKY FOUNDATIONS

The landscape of the Westmorland Dales has its foundation in the underlying rocks and is the result of millions of years of Earth history. The beautiful countryside around Smardale tells a story of tropical seas, glaciers and the shaping of the landscape by people.

SUN, SEA AND SAND

The Westmorland Dales is largely made up of layers of limestone, sandstone and mudstone which formed between 350 and 320 million years ago in the Carboniferous Period. Northern England lay near the Equator and was periodically covered in shallow tropical seas and swampy river deltas. Limy, shelly mud on the sea floor hardened into layers of limestone, which we see today as pale grey crags, dramatic pavements and in quarries. Layers of sandstone and mudstone were originally sand and mud deposited in the deltas that built out into the seas. Over the centuries the local Carboniferous limestone and sandstone have been quarried for a variety of uses, as you'll see on this walk.



Left: A Carboniferous tropical sea, full of creatures now preserved as fossils.

Below: A colonial coral (left) and a brachiopod shell (right) found in stone walls around the walk.



ICE AND WATER

In more recent geological times the landscape has been sculpted by ice and water. At the height of the last ice age, around 26,000 years ago, there would have been hundreds of metres of ice above you here. Glaciers and torrential meltwater scoured the fells and dales. Water continues to shape the landscape. Rainwater is gradually dissolving the local limestone, and the area's becks and rivers are constantly eroding, transporting and depositing material.

EXPLORING THE WESTMORLAND DALES

This lovely part of east Cumbria forms the north-western corner of the Yorkshire Dales National Park. With support from the National Lottery Heritage Fund, the Westmorland Dales Landscape Partnership is working with Cumbria GeoConservation and other partners to reveal and celebrate the area's rich natural and cultural heritage, including its superb geology and landscape.

Walk length/time: 4 $\frac{2}{3}$ miles / 7.5km, 2.5 - 3 hours

Start: Cumbria Wildlife Trust car park at Smardale NY742083

Terrain: Public rights of way across fields and open fell, a footpath along the old railway and short road sections. Take care near the quarry faces, limekilns and steep slopes.

Facilities: Refreshments and toilets in Kirkby Stephen

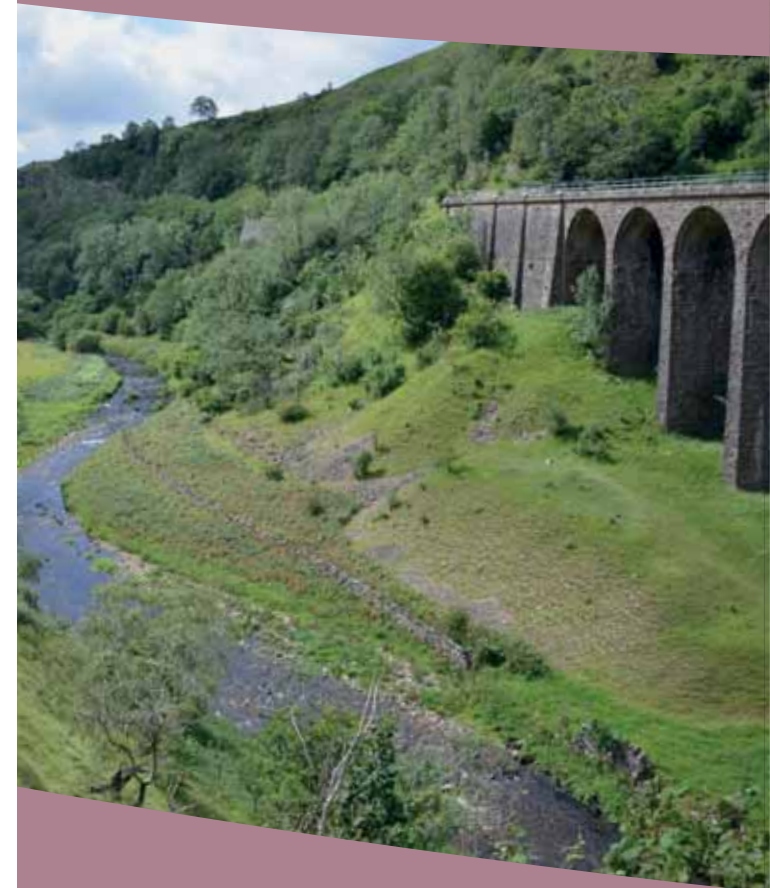
OS map: Explorer OL19 Howgill Fells & Upper Eden Valley



WESTMORLAND DALES

A geology walk around SMARDALE

4 $\frac{2}{3}$ miles / 7.5 km



Cumbria
Wildlife Trust

www.cumbriageoconservation.org.uk

www.cumbriawildlifetrust.org.uk

www.yorkshiredales.org.uk • www.friendsofthelakedistrict.org.uk

thewestmorlanddales.org.uk • dalesrocks.org.uk



Made possible with

Heritage
Fund

👉 Look out for these features along the way!

Map based partly on OS mapping © Crown copyright 2021 Ordnance Survey, Media 061/21. Illustrations © E Pickett, Photos © M Byron/E Pickett except as indicated.

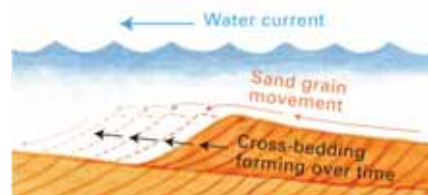
A The local stone walls are great places to spot **fossils** in limestone. Keep an eye out all around this walk and you'll see good examples of colonial corals and brachiopod shells.

B Small-scale quarrying of limestone in the past has left grassy hollows and low rock exposures. The limestone was used for walling and may also have been burnt to make lime for improving upland fields.

C There's a stepped hill profile on the skyline to your right (west). This reflects erosion of layers of harder and softer rocks. Limestone is hard and resistant, whereas mudstone and sandstone wear away more easily.

D The stone walls here include good examples of fossil-rich limestone and also blocks of the red sandstone quarried near Smardale Bridge and on the east side of Smardale Gill (see map).

E Near historic Smardale Bridge red **Ashfell Sandstone** was once quarried as building stone, including for the viaduct which carried the Stainmore railway from 1861 to 1962. Sloping layers in the rock are known as **cross-bedding**. This feature formed in Carboniferous deltas when flowing water caused sand ripples and dunes to move downstream (see below).



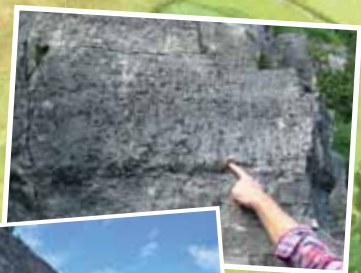
F Smardale Gill has existed since long before the last ice age, but not as we know it today. Drainage patterns have changed greatly over time and Scandal Beck has not always flowed here. **Glacial meltwater** in the last ice age deepened the gill and established the present drainage.

G **Ashfell Limestone** from **Smardale Gill quarry** was once burnt in the large **limekilns** and the resulting lime loaded onto trains. Some layers (beds) are rich in **fossils** of brachiopod shells and corals. Today the quarry is an important grassland habitat, where wild flowers attract butterflies including the northern brown argus and Scotch argus.

Scotch argus butterfly



Limekilns and fossil-rich layers in limestone at Smardale Gill quarry



Smardale Gill Viaduct

Smardale Gill quarry

Old sandstone quarries

Smardale Bridge



Sandstone quarry near Smardale Bridge

Fossil coral in stone wall



1 From the Cumbria Wildlife Trust car park take the track past the old railway waggons (including CWT information hut). Climb the ramp onto a road. Turn left and then keep right, passing Smardale Hall on your right, and go under a railway bridge.

2 Go through a gate onto the fell and keep right on a stony track past a plantation. Bear left to gate, and stay on what is now a faint grassy track to another gate, keeping the wall on right [👉A].

3 Follow grassy track, and stay on fell edge with wall on your right [👉B]. Follow the brideway signed 'Coast to Coast Smardale Bridge' [👉C]. After around ½ mile go through a gate and down a track.

4 Go through another gate and follow the sunken stony track downhill [👉D]. Just before Smardale Bridge there's the option for a short detour on the left to an old sandstone quarry [👉E]. Retrace your steps to the track, turn left over bridge and then right, following Coast to Coast Walk up to a wide rough track. Just before bridge, cross stile and drop down to the old railway.

5 Turn right and follow railway path 2 miles back to Smardale, passing large limekilns and an old limestone quarry [👉G] and crossing the spectacular viaduct on the way. At Smardale turn left to road. Turn right and at junction follow path down ramp back to car park.

↑ Crosby Garrett

↑ Kirkby Stephen

Car park

Smardale Hall

↑ Waitby

Settle - Carlisle Railway

Smardale Gill

Scandal Beck

N

0 ¼ mile

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