The Deposition
High Cup Nick

Permian and triassic sandstones

There are three main bands of rock that make up the Pennines: Carboniferous Limestone, the Yoredale Series and Millstone Grit.

CARBONIFEROUS LIMESTONE
Tournaisian and Visean (Carboniferous Limestone)*
Ludlow
Andesitic and basaltic lavas and tuffs
Extrusive Igneous Rock
Basalt and spilite
Intrusive Igneous Rock
Granite*
Silurian
Andesitic lava and tuff
Permian & Triassic
Namurian (Millstone Grit)*
Upper Old Red Sandstone
Westphalian (Coal Measures)
Bellingham
The Deposition

The calm clear conditions of the carboniferous seas that lead to the formation of limestone changed with the spread of a large river delta from the north. The river that formed ... again accumulate. In this way the bands of limestone, shale and sandstone that make up the Yoredale Series were formed.

Gargrave

From Kinder Scout to Cross Fell these grits form edges (Standedge, Blackstone Edge) and sometimes top the hilltops (Cross Fell, Great Shunner Fell).

This side of the leaflet is intended to give walkers on the Pennine Way National Trail a simple explanation of the rocks they are passing over, and to illustrate how to use a map and compass.

Coaches, buses and trains travel the whole length of the Pennine Way and there are regular services to many of the Pennine Way villages and towns.

Take windproofs and fleece.

Take full water and food supplies.

G
Know how to use a map and compass.

G
Know the weather signs and local forecast;

G
Keep alert all day!

Interested?

In partnership with Aurum Press the Countryside Agency has published an official guide for the Pennine Way National Trail which has been written by local expert Tony Hopkins and comes in two parts – South ISBN 1854106724 and North ISBN 1854108514.

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The youngest rocks you will encounter on the Pennine Way but are not actually seen on the Pennine Way until around Skipton.

G
Write a log of your walk.

G
Use the map to check your position.

G
Dedicate the walk to someone special.

Pennine Way
Profile and Geology Map
NATIONAL TRAIL

National Trails in England and Wales

Once in a Lifetime

The Deposition
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Once in a Lifetime
Once in a Lifetime Crowden Beck

Cover Image: Malham Cove

Website: www.nationaltrail.co.uk

Telephone: 00 44 (0)113 246 9222
Email: pennineway@countryside.gov.uk

The Countryside Agency, Yorkshire and Humber Region, 4th Floor, Victoria Wharf, No.4 The Embankment, Sovereign Street, Leeds, LS1 4BA, UK.

For more information contact:

The Cheviot 815m
Norman Nicholson, Portrait of the Lakes, Faber 1963

Triassic mudstones
Permian and triassic sandstones
Magnesian Limestone
Permian mudstones Permian basal breccias, sandstones and mudstones*

Pennines: Carboniferous Limestone, The Yoredale Series and Millstone Grit.

Bellingham

Llandovery

Tuff, mainly andesitic
Andesitic lava and tuff
Basalt and spilite*
Intrusive Igneous Rock
Granite*

*see text

NEWCASTLE-UPON-TYNE

Geology information derived from the Geological map of the United Kingdom, 3rd Edition Solid 1979

Above the limestone are the Yoredale Rocks consisting of beds of less pure limestone, shales and sandstones.

The Deposition

Towards the end of the Carboniferous period a sheet of Dolerite was intruded into the strata over a wide area. This is called the White Shale, which is responsible for the high water table at High Force and Cauldron Snout, the Causey Crags of High Cup Nick and the heights followed by Hadrian's Wall.

Volcanic Activity

In contrast to all the steady deposition further south, further north in Northumberland there was a large volcano pouring out ash and lava into which the granite of the Cheviot itself was later intruded.

Erosion

All deposits described above formed a flat plateau. From this plateau the oldest rocks that are visible today were eroded. Fast by rain coming out their valleys as the last ice melted. There were many types of rocks which were removed from the surface and transported as sediments. The rocks which were left behind are the rocks you see. The map to the left shows the geology of the area and the text gives a brief description of how it happened.

The Mountain Code

Know how to use a map and compass.
Know the weather signs and local forecasts, plan within your capabilities.
Know simple first aid and the symptoms of exposure.
Take waterproofs and footwear.
Ensure someone knows your plans.
Keep alert all day!

Interested!

The Pennine Way Association produces an Accommodation and Information Guide and further information can be found at www.penninewayassociations.org.uk


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Photography ©McCoy Wynne and David Phillips.

“To look at the scenery without trying to understand the rock is like listening to poetry in an unknown language. You hear the beauty, but you miss the meaning”

Hume Wilson, Pennine Way, 1967

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To help plan your walk, comprehensive public transport and accommodation leaflets are also available from www.pennineway.co.uk

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Photography ©McCoy Wynne and David Phillips.

“While walking along the Pennine Way National Trail, the profile map on the reverse side of this leaflet shows how far and how much climb is involved in each section. It also gives an indication of how long each section will take to walk.

This side of the leaflet is intended to give walkers an idea of the rocks they are passing over and to illustrate how the land that we see today came to be. The map to the left shows the geology of the area. The text gives a brief description of how it happened.”

John Needham, 233 Woodland Crescent, Hilton Park, Preston, Lancashire, PR5 1QQ, UK.

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The Deposition

There are three main types of rock that make up the Pennines: Carboniferous Limestone, The Yoredale Series and Millstone Grit.

CARBONIFEROUS LIMESTONE

Some 400 million years ago the current location of the Pennine Way was covered by a shallow clear sea of a constant temperature in which corals grew. An coral reef, which forms the largest known reef in the world, grew over the sea bed. As the sea slowly withdrew, the dead coral reefs were carried ashore by the winds. Over the years these coral reefs came together to form a huge layer of limestone up to 150 metres thick.

These are exposed in Castleton to the south of Edale near the start of the Pennine Way but are not actually seen on the Pennine Way until around Skipton.

YOREDALE SERIES

Above the limestone are the Yoredale Rocks consisting of both of pure limestone, shales and sandstones. The sand layering conditions of the sedimentary rocks that lie beneath the Pennine Way show the presence of sediment deposited from the sea. The Pennine Way is cut by the river valleys of the rivers that formed this delta carried river and intermittently across the area where limestone had been deposited. During the time the river was slowly flowing at an irregular rate, limestones and shales were deposited in layers, creating the Yoredale Series. These layers consist of limestone, mudstone, shale and sandstone that make up the Yoredale Series were formed.

MILLSTONE GRI

On the other side of the park theengl target="_blank"; right of the Pennines is the Millstone Grit. Created in a time when rivers running from a forest containing Greatwood, Sandwood and Scandinavian spread deposits of sand and mud over an extensive delta to form the Millstone Grit. From Kinder Scout to Cross Fell these grits form edges, clear hills, rounded hills and dramatic key side hills with red grits (Cross Fell, Great Shunner Fell).

Erosion

All deposits described above formed in a wet climate. The Pennine Way was covered by a shallow sea of a constant temperature in which corals grew. As the sea slowly withdrew, the dead coral reefs were carried ashore by the winds. Over the years these reef came together to form a huge layer of limestone up to 150 metres thick.

These are exposed in Castleton to the south of Edale near the start of the Pennine Way but are not actually seen on the Pennine Way until around Skipton.
### PENNINE WAY ROUTE IN PROFILE

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### Section Details

- **Section 1**: Edale to Crowden - 16 miles (27.5 km), 911m ascent, 6 hours walking.
- **Section 2**: Crowden to Standedge - 11 miles (17.7 km), 773m ascent, 4 hours 1/4 walking.
- **Section 3**: Standedge to Hebden Bridge - 15 miles (24.1 km), 666m ascent, 5 hours walking.
- **Section 4**: Hebden Bridge to Ponden - 10 3/4 miles (17.3 km), 692m ascent, 4 hours 1/2 walking.
- **Section 5**: Ponden to Thornton-in-Craven - 11 1/2 miles (18.5 km), 646m ascent, 4 hours walking.
- **Section 6**: Thornton-in-Craven to Malham - 10 1/2 miles (16.9 km), 371m ascent, 3 1/2 hours walking.
- **Section 7**: Malham to Horton-in-Ribblesdale - 14 1/2 miles (22.9 km), 852m ascent, 5 1/4 hours walking.
- **Section 8**: Horton-in-Ribblesdale to Hawes - 13 3/4 miles (22.1 km), 560m ascent, 4 3/4 hours walking.
- **Section 9**: Hawes to Keld - 12 1/4 miles (19.7 km), 708m ascent, 4 1/2 hours walking.
- **Section 10**: Keld to Bowes - 12 1/2 miles (20.1 km), 369m ascent, 3 1/2 hours walking.
- **Section 11**: Bowes to Forest-in-Teesdale - 18 3/4 miles (30.2 km), 651m ascent, 5 3/4 hours walking.
- **Section 12**: Forest-in-Teesdale to Dufton - 13 1/2 miles (21.7 km), 461m ascent, 4 1/2 hours walking.
- **Section 13**: Dufton to Alston - 19 1/2 miles (31.4 km), 1069m ascent, 7 1/4 hours walking.
- **Section 14**: Alston to Greenhead - 16 1/2 miles (26.6 km), 577m ascent, 5 1/2 hours walking.
- **Section 15**: Greenhead to Steel Rigg - 6 1/2 miles (10.6 km), 416m ascent, 5 1/4 hours walking.
- **Section 16**: Steel Rigg to Bellingham - 14 3/4 miles (23.7 km), 504m ascent, 5 hours walking.
- **Section 17**: Bellingham to Byrness - 14 3/4 miles (23.7 km), 544m ascent, 5 hours walking.
- **Section 18**: Byrness to Clennell Street - 13 3/4 miles (22 km), 844m ascent, 5 1/4 hours walking.
- **Section 19**: Clennell Street to Kirk Yetholm - 11 1/2 miles (18 km), 776m ascent, 5 1/4 hours walking.