## HOW THE BOOK IS ORGANISED

We have followed these principles in writing the book:

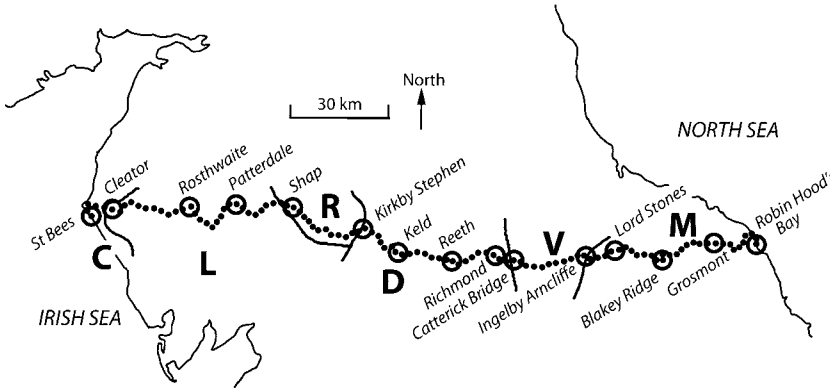
- We assume that your primary purpose is the achievement of walking the distance from St Bees to Robin Hood's Bay. So we keep the descriptions of what you see while walking as short as possible.
- Different parts of the text appear in different kinds of type as follows:
  - The rocks and scenery at specific Locations are described in sequence as they come into view along the line of the Walk. This part of the text is in black type.
  - *Brief descriptions of the Walk from one Location to the next are in italic type with a grey background.*
  - More detailed explanations of what you have seen, or what you will see, are provided in a "Journal", in blue type, which you can read at any time. It will be most effective if you can read it soon before or just after the day's walking.
- Geological ideas and methods are developed as the Walk progresses. You don't need any previous knowledge of rocks and scenery.
- We avoid using technical terms but where they have to be used they are highlighted in **bold** type and defined in the Glossary.
- We describe only what you can see from the Route, though we will sometimes refer to evidence from a wider area when it increases the interest and understanding of the explanation.

By the time you reach Robin Hood's Bay we think you will be pleasantly surprised at how much you understand about the way the Earth works and about the evolution of northern England.

The Walk divides naturally into stages, both in the type of walking and in the rocks and scenery of each region. We use these letters for identifying the Locations and Figures:

**C** the west Coastal region, from St Bees to Cleator
**L** the Lake District, from Cleator to Shap Abbey
**R** Ravenstonedale, from Shap Abbey to Kirkby Stephen
**D** the Yorkshire Dales, from Kirkby Stephen to Catterick Bridge
**V** the Vale of Mowbray, from Catterick Bridge to Ingleby Arncliffe
**M** the North York Moors, from Ingleby Arncliffe to Robin Hood's Bay.

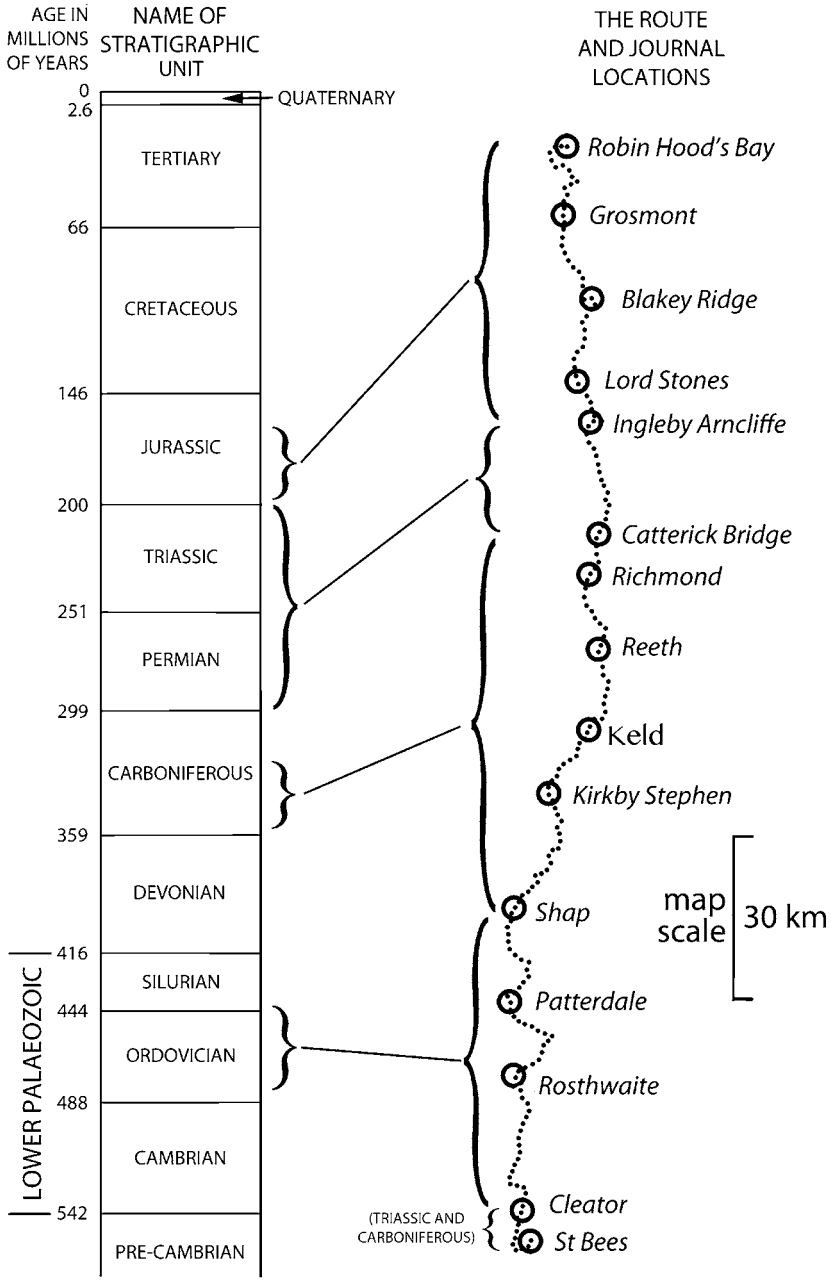
To make it easy to match Figures to Locations we use the same number for each.




From Cleator to Robin Hood's Bay, the rocks get progressively younger; the chart on the next page shows the ages of the rocks we shall see on the Walk. Because rocks get younger upwards, you have to read the chart, and the direction of the Walk, from the bottom upwards.

## A WORD ABOUT MAPS AND ROUTE–FINDING

The maps and the Route descriptions in this book are to help identify the Locations. They are not detailed enough for route–finding, especially in conditions of poor visibility. You will definitely need more–detailed maps. For safe walking we recommend Geographers' *A–Z Coast to Coast Walk* – the complete route in a compact booklet – or Harvey Maps' *Coast to Coast West* and *Coast to Coast East* sheets. Various apps provide high–quality digital maps, such as the UK Map by Phil Endecott. There are several descriptive guides to the Walk, including an updated edition of Alfred Wainwright's original guidebook.


AGE IN MILLIONS OF YEARS
NAME OF STRATIGRAPHIC UNIT
THE ROUTE AND JOURNAL LOCATIONS
0
2.6
QUATERNARY
TERTIARY
66
CRETACEOUS
146
JURASSIC
200
TRIASSIC
251
PERMIAN
299
CARBONIFEROUS
359
DEVONIAN
416
SILURIAN
444
ORDOVICIAN
488
CAMBRIAN
542
PRE-CAMBRIAN
LOWER PALAEOZOIC
Robin Hood's Bay
Grosmont
Blakey Ridge
Lord Stones
Ingleby Arncliffe
Catterick Bridge
Richmond
Reeth
Keld
Kirkby Stephen
Shap
Patterdale
Rosthwaite
Cleator
St Bees
(TRIASSIC AND CARBONIFEROUS)
map scale
30 km

# JOURNAL 1 – ST BEES

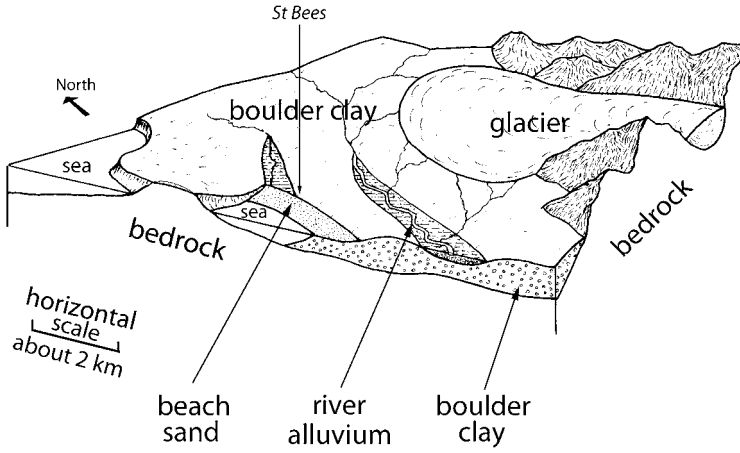
We use the first stage of the Walk – from St Bees to Cleator, crossing rocks from Carboniferous to Triassic in age – to introduce ways of looking at rocks and scenery. And we start with a very short issue of the Journal to present some essential ideas.

## BEDROCK AND SUPERFICIAL ROCKS

The coastal scenery at St Bees was formed in the last few thousand years, during and after the Ice Age. In complete contrast, the red rocks in the cliffs were made 240 million years ago in a desert region near the centre of a supercontinent a few degrees north of the Equator. How all this came about will become clear in the course of the Walk.

It's convenient to make a distinction between **bedrock** (meaning rocks formed before the Ice Age, which began about 2.6 million years ago) and **superficial rocks** (meaning the younger rocks that cover the bedrock). On the Walk we shall see both bedrock and superficial rocks and scenery.

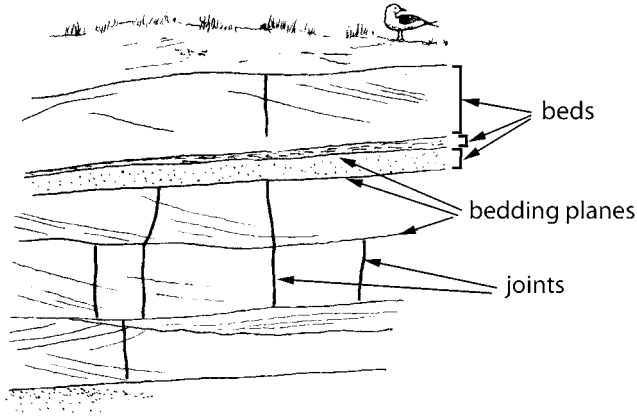
Because the Ice Age was geologically so recent, ending only 10,000 years ago, the effects of the glaciers and ice sheets on rocks and scenery are evident everywhere. The generally smoothed topography of the St Bees headland, inland from the cliffs, is the result of a combination of both erosion and deposition during the glaciation.




*An impression of a small part of the western Lake District towards the end of the Ice Age, based on the St Bees area. Ice originally covered all the lowland and extended over the sea.* ***Boulder clay****, river* ***alluvium****, and beach sand are all classed as superficial deposits covering the bedrock.*

## BEDS AND BEDDING PLANES

The cliffs on the west side of St Bees Head are made of red **sandstones**. A characteristic of these and most other **sedimentary rocks** is that they were deposited as layers or **beds**.



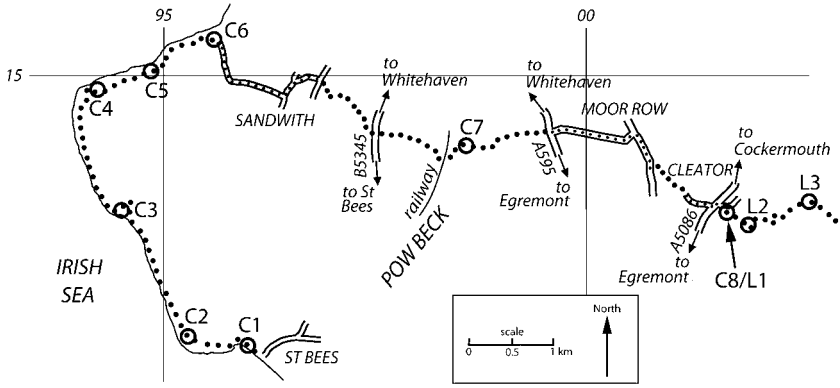

*A sequence of beds of sandstone in the cliffs at St Bees. The surfaces between the beds are called **bedding planes**. Structures inside the beds (like the fainter oblique lines) can be used to find out about the environment of the time. The nearly vertical **joints** are cracks formed after the beds had solidified into rock. Although they are often prominent features of an exposure, they usually provide little information about how the rocks were made.*

*St Bees Priory Church, west door.*
*The local rock makes fine building stone.*

# 1. THE WEST COASTAL REGION

The first part of the Walk is on rocks of Triassic age, magnificently exposed in the coastal cliffs but inland covered by superficial rocks. The Walk continues on Carboniferous rocks, completely covered by superficial rocks. We use this section of the Walk as a simple introduction to some ideas about how to look at rocks and scenery.

## THE WALK – ST BEES TO CLEATOR




*St Bees to Cleator*

## THE PRESENT AS A KEY TO THE PAST

Location **C1**, NX 960 118, at "Wainwright's Wall". As you zip, button, and strap yourself into your kit for the first day of your Walk, give some thought to the scene around you.

*Fig. C1. The foreshore at the north end of St Bees beach.*

Everything you can see is in motion, driven by the forces of the Sun, the wind, the waves, and the gravitational attraction of the Earth itself. Even the rocks are changing, though slowly by human standards. The cliff is being weathered and eroded by frost and rain, seabirds and sheep, and the people ten minutes ahead of you on the Walk. The pebbles and sand on the shore are constantly moved by waves, tides, and by the stream that enters the bay at the north end of the promenade. And imagine the activity beyond the ever–changing shoreline, with marine fauna and flora, and vast quantities of sand, mud, seashells, and terrestrial debris. This postcard view provides clues to much of what we shall see in the next 300 km, and the means to understand it by using the present day to model processes in the past.

*From the north end of St Bees beach walk along the coast path for ¾ km to the next Location. On the way, near the top of the cliff, you pass the fenced–off Pattering Holes – open joints in the rocks below ground level.*

## DIFFERENCES WITHIN SANDSTONES

Loc. **C2**, NX 952 119, at the top of the cliff where there is a concrete shelter with explanatory signboards. Take a look at the rocks in the low vertical face a few metres north of the signboards.

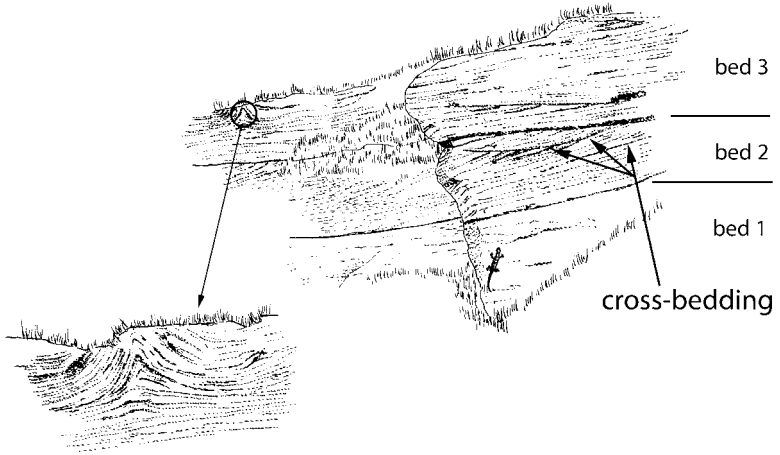



*Fig. **C2.** Three **beds** of **sandstone** (solidified sand) are labelled 1, 2, and 3 in the drawing. They are marked by slight differences in their red colours, and by differences in their internal structures.*

Bed 1 is almost the same throughout its vertical thickness and was probably deposited very quickly.

Bed 2 is made up of numerous smaller beds, and the **bedding planes** between them are slightly tilted. This is called **cross–bedding**, and results from a stream entering an area of still water and depositing its load of sand as tilted layers.

The feature shown in bed 3 (and in more detail in the inset) indicates that when it first formed the sediment was like a quicksand. Excess water at the time of deposition escaped, with distortion of the bedding (the structure is sometimes called a sand volcano).

The rocks at this Location were formed about 240 million years ago, in the Triassic period (see the chart in the Introduction). The processes that made them were broadly similar to those in the stream at the north end of Wainwright's Wall, with the difference that here the environment was a desert and the streams flowed only occasionally. Dinosaurs were just beginning to evolve; the Common Lizard near the bottom of the drawing is a relative of his more terrible reptilian ancestors.

*Continue along the top of the cliff for 1¾ km to where the coast path comes down to sea level.*

## MORE SANDSTONES

Loc. **C3**, NX 945 134, Fleswick. These are the same kind of rocks as at the last Location, but there are more to see.

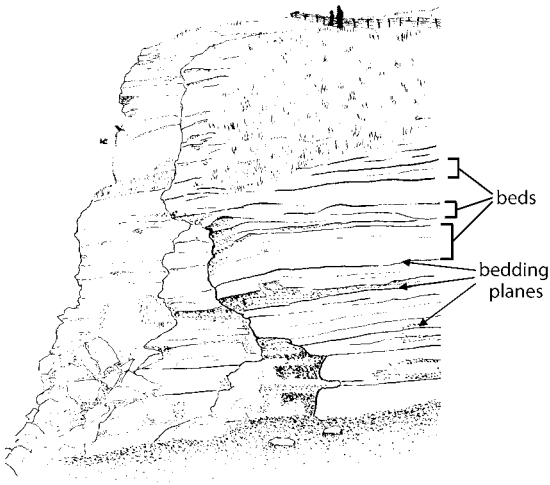



*Fig. **C3.** The north side of the inlet at Fleswick, from the shore. (You don't need to find the exact viewpoint, but if you want to, it is close to where the stream meets the beach).*

The continuity of individual beds across the width of the exposure and still further along the cliffs implies that they extend laterally for a long distance. The general similarity of the beds over the full height of the cliff, notably the sandy nature and the red colour (an indication of a hot arid environment), implies a similarity of conditions of formation over an extended period of time, probably hundreds or thousands of years. A wider view of the Triassic environment is in the next issue of the Journal.

*Walk on, using the coast path, for 1¾ km, to where the cliff turns east and Whitehaven comes into view.*

## TILTED BEDS

Loc. **C4**, NX 942 148, the cliff face you can see across a small gully.

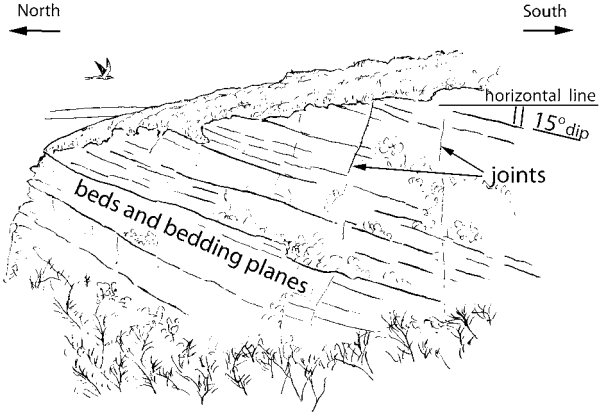



*Fig. **C4.** The cliff shows tilted Triassic sandstones. The amount of tilt is called the **dip** – in this case 15° to the south. We explain how rocks get tilted in Journal 2.*

*The next location is ¾ km ahead, in a field fenced off from the cliff top.*

## ERRATIC BOULDERS

Loc. **C5**, NX 949 151. (It is not necessary to find the exact location, as you will see plenty more boulders like these).

*Fig. **C5.** Two boulders lying near the top of the cliff. They are very hard (try scratching them !).*

The boulders are smoothly rounded, showing that they have been worn by erosion and must have travelled some distance. They are rocks from the central Lake District and were transported to here by a glacier during the final stages of the Ice Age, about 10,000 years ago. They are erratics, that is, boulders that belong to the superficial geology, and not derived directly from the local bedrock – the red sandstones.

*Walk on along the coast path for ¾ km.*

## ROCKS OF ECONOMIC VALUE

Loc. **C6**, NX 956 154, a working quarry at the top of the cliff. Here we return to the Triassic bedrock.

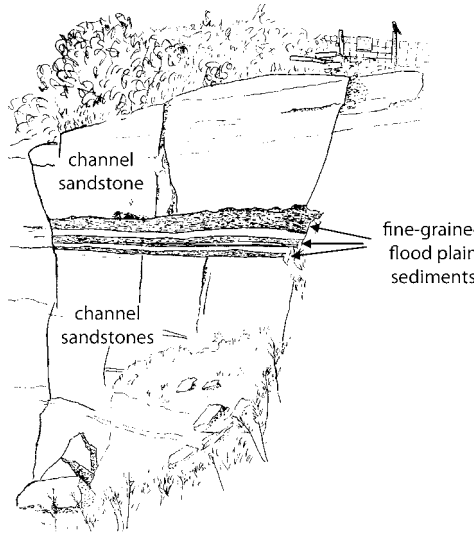
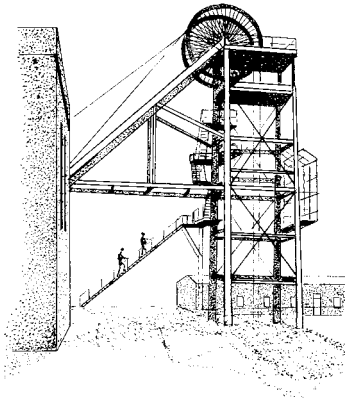



*Fig. **C6**. Part of the north (seaward) wall of the quarry. The thick red sandstones were deposited in river channels (much wider than the width of the exposure) in the Triassic desert. The thin fine-grained layers are muddy sediments from river **floodplains**. The thickness and uniformity of the sandstones make them ideal for use as building stone.*

Out of sight at the base of the cliff there is the disused mine entrance to gypsum deposits below the red sandstones. (Gypsum is a mineral mainly used for making plaster.) **Coal** was extracted from rocks of Carboniferous age at Whitehaven; the mines were worked below the seabed and extended for up to 8 km to the north and west of where you are standing.

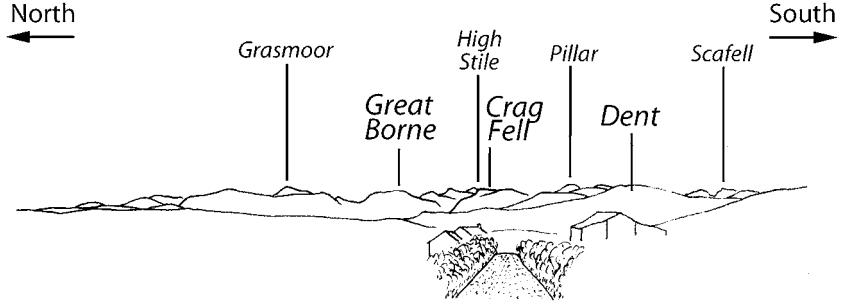


*Winding headgear at the Haig Colliery Mining Museum in Whitehaven.*

Almost every rock–type is potentially of economic value, though its commercial importance depends on factors such as the quantity available, the costs of extraction and transport, and the demand for the resource.

*The next Location is 4 km ahead. The Route crosses the gently undulating surface of the superficial deposits left behind after the melting of the glaciers, covering the red Triassic sandstones of the bedrock.*

*Walk along the road into Sandwith, where you turn left. At the end of the village bear right and uphill. Follow the road up to a T–junction and then into the green lane opposite. This leads through Demesne Farm to the B5345 from St Bees to Whitehaven. Cross the road into another farm road; on a clear day there is a panorama of the Lake District:*




*The Coast–to–Coast Route goes over the top of Dent, and then between Crag Fell and Great Borne into Ennerdale.*

*Follow the road for 600 metres and, beyond the houses, follow the footpath, which forks downhill to the left. Stop on the far side of the railway bridge at any point where you get a clear view to the right (southwest).*

## A BEDROCK BOUNDARY AND A POST–GLACIAL VALLEY

Loc. **C7**, NX 985 142, on the flat ground near Stanley Pond.

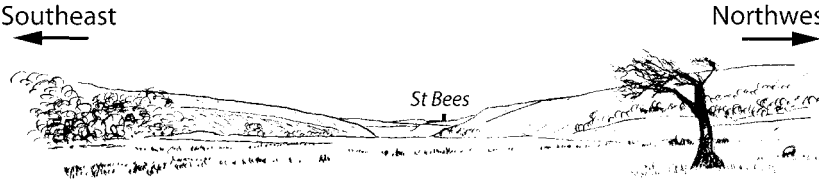



*Fig. **C7.** View southwest down the valley of Pow Beck. The tower of St Bees Priory church is just visible in the distance.*

The flat floor of the valley is here 17 metres above sea level. The bedrock is 50 metres below you or about 30 metres below sea level. Sea level was lower during the Ice Age than it is now because so much water from the oceans was frozen as glaciers and ice–caps. After the end of the Ice Age the valley was filled with river deposits.

All the way from St Bees the bedrock has been desert sandstones of the Triassic, about 240 million years old. As we cross the valley of Pow Beck, the bedrock changes to humid–tropical rocks of the Carboniferous, about 310 million years old. One would really like to see how the change shows in the rocks but, as with many significant bedrock boundaries, this one is covered by superficial deposits. However, the different bedrock is clear in the change of land use from agricultural to industrial. For the next 4 km we walk through towns whose location is based on the mining of coal from the rocks of the Carboniferous.

*Continue on the footpath across the meadows, keeping to the left of the trees. At a bridge under a disused railway, walk on into a lane that leads to the busy A595. Cross to the road opposite into Moor Row. At the town centre turn right on the road to Egremont and after ½ km take the footpath to the left to Cleator. At the T–junction with the A5086 turn left and then next right to Blackhow Bridge.*

Blackhow Bridge across the River Ehen marks the end of the first (west Coast) section of the Walk. On the far side of the bridge there is a complete change in the kinds of rock and scenery. So at this point a rather large issue of the Journal summarizes what we have seen so far; the second part is an introduction to the very distinctive features of the Lake District.