

## **The Background Geology, Geography and Climate**

Some knowledge of the geological and geographical background of the Cockermouth area will help in understanding why a town developed on this particular site and why that development followed certain lines. The results of alternating periods of submersion and elevation, of heat and pressure and of the weathering of higher layers are summarised in Figs. 1 and 2.

The details of these processes are beyond the scope of this book, but we may note geological features which are peculiar to the area. A great earth storm of some 300 million years ago brought desert-like conditions to Cumbria under which rocks were broken down and swept away as debris. In only three areas is this debris found, one of them being the band of the Cockermouth lava. This extends for some seven miles in a SW-NE direction, including the NW bank of the Derwent above the town. There are four or five flows of this hard, dark green basalt (similar to the Giant's Causeway) in the 300 feet thickness of the band, and these are exposed in places by streams entering the river from the NW.

In places near the town the limestone crags convey some idea of the great dome which preceded the Lake District as we know it, before erosive forces wore it down. The view of Pardshaw Crags (OS 103 256) is an example.

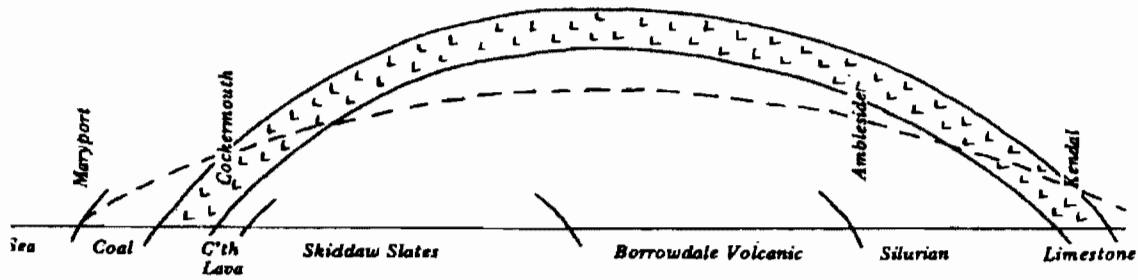
The appearance of the land around Cockermouth has been affected more recently by the glaciations of the last three million years. The U-shaped valleys of Embleton and Crummock-Buttermere, with the falls from hanging valleys along their sides, were shaped by ice. Enormous quantities of rock were transported considerable distances and finished the journey in one of three ways - deposited along the sides of the glacier to form lateral moraines, because the ice moving more slowly here (compare the speed of water near the banks of a river with that in the centre) could not support it; deposited to form terminal moraines when the foot of the glacier melted and the rock pieces sank; or ground down during the journey to form boulder clay. Erratics unearthed during the building of Derwent School were left on the site by ice.

About 20,000 to 15,000 years ago the ice began to retreat, a retreat interrupted by partial re-advances. A tree-covered moraine near Armaside probably marks the melting point of a glacier temporarily halted during its retreat up the valley.

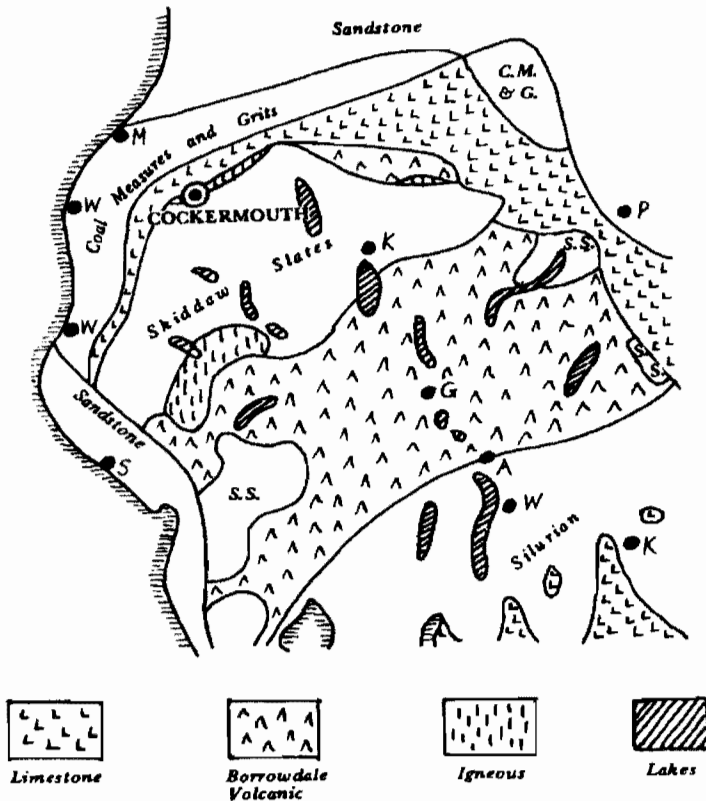
By approximately 11,000 BC most of Cumbria was free of ice, the mountains being surrounded by a tundra-like landscape of badly drained boulder clays. During this period of melting great glacial lakes were formed, which eventually burst out of the hollows in which they were trapped to scour wide channels down to the coast, valleys now dry or occupied by only a small stream. The Embleton valley is an example. A feature of this valley is the flat-topped sand and gravel delta near High Netherscale, formed when the nearby lake was considerably higher than now and which forced the River Derwent to find a new route to Cockermouth. The great glacial lakes in our area gradually shrank to Crummock-Buttermere and Bassenthwaite-Derwent, to be separated later by debris washed down from the neighbouring hills.

Ice flowing north from the Lakeland dome met that flowing south from the Scottish Uplands, with the result that part of both streams were turned eastwards and the rest westwards, where the two flows travelled side by side along the coastal plain to Morecambe Bay and beyond. The majority of the hills north and west of Cockermouth are long cigar-shaped banks of clay (drumlins) built up in the direction of the ice stream. In the Gilcruix area these show clearly the NE to SW drift of the Scottish ice, while nearer the town the long axes of the hills indicate the direction of the Lakeland flow changing from E-W to N-S. Looking south from Cockermouth there can just be seen the central dome of bare Borrowdale Volcanics, rugged and jagged in contrast to the rounder grass-covered fells of Skiddaw Slate of almost all the Buttermere-Lorton valley. West and north of the town lies the local section of the carboniferous limestone which almost rings the Lake District (Fig. 2) and the clints and grikes of limestone pavements may be seen on Tallentire Hill and elsewhere.

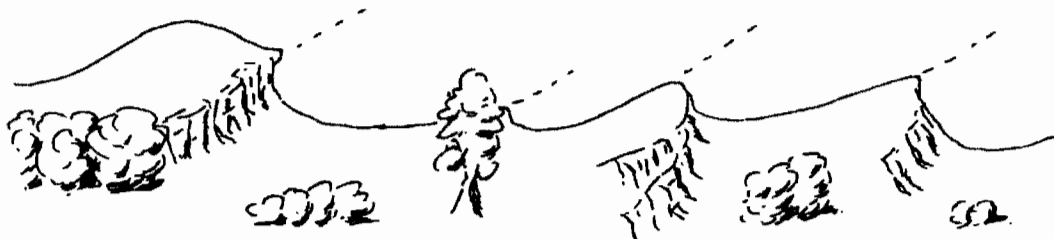
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**Fig 1.** Diagram showing the wearing down of the dome to produce fig 2. and limestone effects in fig 3.



**Fig 2.** Simplified geological map of the Lake District



**Fig 3.** The limestone outcrops of Pardshaw Craggs seen from the SW, suggesting the Lakeland dome

In the valleys and on the Cumbrian Plain the basic rocks are covered with material carried down and dropped by the ice or washed down by streams and then deposited as the land became level and the water lost its speed the sands and gravel, silt and soil, but mostly boulder clay which have made this an agricultural district.

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In the town itself is a small area of glacial gravel, beginning with the Kirkbank-All Saints and Castle hills and extending a short way eastwards to half way up St. Helen's Street.

A band of Skiddaw Slate grits crosses Cockermouth in roughly an E-W direction, its line being broken by faults and the grits overlaid by clay and alluvium, but the basic rock may be seen in the Cocker just above the railway arch (OS 122 304) and in the lower end of Tom Rudd. It is greatly contorted and folded and has minor faulting. It is exposed here in an anticline - a fold arched upwards.

The geologist may find features of interest within a short distance from the town -feldspars, etc., in the summit quarry on Watch Hill; three outcrops of diorite on Slate Fell, with others on the golf course, in Close Quarry, etc.; quartz on Ling Fell and Sale Fell; and dark blue and striped slates outcropping through the drift-covered sides of the Embleton valley. [1]

The geology of the area has given rise to quarrying and a little mining around the town and these industries will be considered later.

Half way to Lorton is the saline spring of Stanger Spa. The water, reputed to be a cure for rheumatism and skin diseases, has a bitter taste and is said to resemble the Cheltenham water which achieved greater fame. [2] It was described in 1829 as "a very strong aperient salt-spring, which is efficacious in all acute diseases of the skin, and is much resorted to in the summer season by invalids from the surrounding country", and a walk to Stanger was a favourite Sunday afternoon occupation of Cockermouth mill workers. Bottles of the water are said to have been sent all over the world and not so long ago one sailor always took a supply to sea. It is now contained in a well about 1½ feet [450mm] square, lined with stone some hundred years ago. A stone building has been erected over it, with four niches in the walls for vessels. Once a visitor had to obtain the key from Stanger, but the building is now dilapidated and the water which cost 6d, [2½p] a bottle is free for the taking.

Many Cumbrian towns are built of the local available stone - slate, limestone or sandstone. [3] In Cockermouth one building stone does not obviously predominate. Walls of river cobbles are a feature of much of the older property still standing, door and window openings being framed in dressed stone. Limestone and freestone from the Brigham and Broughton quarries have been used extensively for later buildings, such as the Court House and the auction marts. Rendering is common on houses of every period, including the recent estates of brick and manufactured blocks.

Cockermouth did not develop into a town as the result of mining and quarrying in the area, but because of another industry fostered by the geology of the district - farming. The soil cover in the foothills varies from loams derived from limestone to heavy soils, difficult to work, coming from boulder clay. Although there are some good arable stretches, grassland predominates, supporting cattle-rearing and milk production. There are also large numbers of sheep on both the foothills and the plain. Farming, especially stock-farming, requires a central market town, a need fulfilled by Cockermouth.

The actual site of the town was settled by the river system and the ridge of glacial gravel in the castle area referred to above. A settlement developed beneath the castle, erected in this defensive position as an improvement on Papcastle. It is not clear whether the rivers always joined at this point, for there is a tradition that in the time of Edward I (1272-1307) the Derwent was diverted to pass under the castle promontory, thus increasing its defences. Previously, tradition states, the river followed a fairly straight course from below Wood Hall along the foot of Mickle Brow to just beyond the Gote. Askew claimed that in 1866 many traces of the old channel were still visible and E.R. Denwood said that the old bed of the Derwent could be seen in 1946 behind the tarn which lay east of the foot of Gote Brow. The discovery of river gravel in this area when digging the foundations of James Walker's factory supports the tradition. If this theory is correct then the present line of the Derwent from the castle to Papcastle would at one time be the course not of the Derwent but of the Cocker.

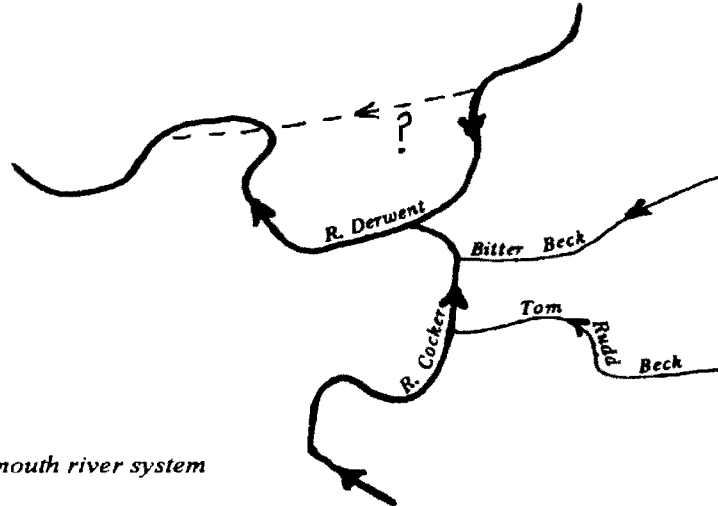
The stronger Derwent would slow up the Cocker at its outflow, causing it to deposit suspended material, as can be seen occurring today where the small Bitter Beck enters the larger Cocker and a bank of stones builds up. This meant that it would be possible to ford the Cocker at its mouth if it were not in spate, as suggested on early maps by roads terminating on both banks at this point. Eventually Barrel (Brewery to Waterloo St) Bridge was erected here.

Referring to the wealth of water power in Cockermouth, Mannix and Whellan observed in 1847

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“Besides being intersected by the Derwent and Cocker rivers the town is also refreshed by two smaller streams which rise a few miles to the east, and are a great convenience to the manufacturers of Cocker mouth and neighbourhood.”[4]

The two are Tom Rudd Beck, rising on the north of Kirk Fell, and Bitter Beck which drains the Elva Plain area. The two becks and the two rivers turned a considerable number of water wheels.



**Fig 4.**  
*The Cocker mouth river system*

Not always have the rivers been “a great convenience” to Cocker mouth. There is a long history of flooding, caused usually by heavy rain in the central fells. The catchment area of the town’s rivers is very extensive, reaching eastwards as far as Great Mell Fell beyond Troutbeck and bounded in the centre of the Lake District by Dunmail Raise and Esk Hause. Six lakes are included. The Cocker is reputed to be one of the fastest rising rivers in the country and the effect of heavy rain in the mountains is soon witnessed in the town, whereas the water travelling by the Derwent arrives some two days later. If the rain in central areas is prolonged then the Cocker is still in spate when the Derwent rises and flooding is more likely to occur,

There was “a prodigious flood at Cocker mouth, which carried away several houses, mills, etc.”, on or about the 21st November 1761 [5], followed ten years later by a great flood caused by the sudden melting of snow on the hills. There was another severe one in 1852 and in 1874 the local press recorded extensive flooding of industrial premises - Mr. Fletcher’s tannery was useless, Mr. Smethurst’s hat factory and Messrs. Pearson’s tweed mill on the opposite side of the Cocker were flooded, while in Pearson’s other factory near Cocker Bridge the water lifted beams, vats and boilers. Mr. Wyndham’s brewery and Messrs. Herbert’s foundry also suffered. Goods were ruined in many shops, sheep were drowned at a butcher’s, Main Street was under water and, as always, the Gote was flooded. [6] This was a fairly common picture, even into this century. A particularly severe flood occurred in early October 1918 (Plates 28 & 29).

On 3rd November 1931 Main Street, High Sand Lane, Waterloo Street and the Gote were under water [7] and on 18th December of the following year there were floods from Keswick to the coast. In this disaster, said by some to be the worst in memory (a frequent comment in time of flood!), rivers swollen from rain in the hills were raised still further by 5.2 inches [132mm] recorded at the castle in six days. Main Street was flooded from the Police Station to Wordsworth House and the water was over Barrel Bridge and halfway up the stairs of High Sand Lane houses. [8] Following this 1932 flood action was taken to prevent a recurrence. The river had been kept reasonably deep by the removal of cobbles for house building and road repairs. The workhouse used a handcart to transport cobbles of which men had to break two bucketsful in return for bed and breakfast (while the women worked in the kitchen or laundry). [9] The workhouse closed in the 1930s and cobbles had long since ceased to be used for house building. This small scale but continuous clearing having stopped, a major effort

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was undertaken in 1936. Gravel from the river-bed was deposited on land later to become the Memorial Gardens, two breakwaters on the mill side of the Derwent designed to divert water across the river were removed, [10] and three square arches were added to the northern end of Derwent Bridge in an attempt to lessen flooding in the Gote. Clearings have been made since then in 1947 the lower end of the Cocker was deepened, material being deposited below Waterloo Bridge on the left bank of the Derwent, and in July 1969 stones and gravel were removed and deposited on the same bank between the Mill Bridge and St. Joseph's Church. [11] In 1975 gravel was extracted below Mill Bridge for use in constructing the A66, but this was not geared to flood prevention.

In spite of the efforts of 1936 the town suffered severe flooding during August Bank Holiday weekend in 1938. Water reached parts of Cocker mouth never previously affected. Thirty hours of rain raised the Cocker to 15 feet above normal at Cocker Bridge and the river cascaded down a fall of six feet into the lower Derwent. Barrel Bridge collapsed as debris built up behind a wedged tree. As it did so Isaac Wordsworth, a county council workman, slipped into a crack but was grabbed in time and rescued. Quaker Bridge lost railings and masonry. A section of the main sewer which passes under Cocker Bridge was found a hundred yards away. Pavements were lifted in Challoner Street as the Cocker took a short cut through the town. Sewers backed up, water entered the gas main and houses suffered extensive flood damage - the water was eight feet deep in one court off Market Street. Documents were destroyed as the river poured through the vaults of the Midland Bank and Huddart's shop on the opposite side of the bridge was also severely damaged, to the extent that it had to be demolished and the business transferred next door. The vacant plot may be seen on the river bank.

There was some consolation in the fact that, consequent on the alterations to Derwent Bridge, flooding in the Gote area was not as severe. Fishing in Main Street might also be regarded as a positive result, trout being caught there by hand and a 15 pound pike taken. Numerous spectators, holidaying in the area, came into the town.

Improved river maintenance appears to have been beneficial to the town, the only post-war flood of any consequence being in August 1966 when a freak storm over and to the east of the town caused the two becks to rise rapidly. A culvert at Butts Fold collapsed, blocking the channel, so that water poured down St. Helen's Street flooding about fifty houses and shops as far as Cocker Bridge and causing thousands of pounds worth of damage. No. 9 Kirkgate, now demolished, had water four or five inches [100-125 mm] deep in the bedrooms and the height of the flood water in the Market Place is recorded on the door frame of the ironmonger's shop of J.B. Banks by a line 31 inches [780 mm] above pavement level. Tom Rudd Beck also flooded the Skinner Street area.

The 1966 flood gave birth to the Bitter Beck Scheme in which, combined with the demolition of the old hall and the clearing of many old buildings, including the lower end, of Kirkgate, the beck was reculverted and a car park laid out in 1973 at a cost of about £175,000 (Plate 6) (Fig. 76). Even in 1995 the risk of flooding still gives rise for concern, - there was a flood alert in April 1987.

On 8<sup>th</sup> January 2005, Cumbria suffered a tremendous storm with hurricane force winds (120mph recorded at Workington) and excessive torrential rain - with the worst flooding on record since at least 1822. With a month's worth of rain falling in 24-hours, the flood defences were over topped, causing about 3,000 properties across the county to flood. More than 1,700 of these properties (houses and businesses) were in the city of Carlisle. There were spectacular photographs taken of such as Hardwicke Circus, Brunton Park Football Ground and Caldewgate all under feet of water. Cocker mouth, along with other towns such as Keswick and Appleby, was also flooded with some over 100 properties being badly damaged and out of use for several months subsequently. Waterloo Street, the Gote, Main Street were flooded but fortunately the businesses there were not severely inundated. Tree damage throughout the area was severe with an estimated loss of something like 500,000 trees in Cumbria as a whole. There is still the hope that low flood prevention walls along five stretches of river banks in the town can be built.

The rivers have produced other problems over the years. We shall examine later the effect of their use as open sewers and rubbish dumps last century. Even comparatively recently the Derwent Fishery Board has complained of pollution. The scouring effect of the Derwent has necessitated protective work being done below the castle and in 1853 Mary B. Dykes of Dovenby Hall complained that her land below Papcastle was being undermined, for which she blamed the building of a wall

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along 'the Sand' which had narrowed the river and increased its speed and power.

A smaller feature of the drainage system of the town was the tarn which once existed where the auction mart now stands in South Street. It was referred to in a vestry ruling of 1693 -

'It is put in pain that Rd. Uriell shall dress the gutter between the highway and his own Tarn Close 6s.8d.[12]

This pool was fed by two springs, one in the middle of Kittison Lonning and one in Fairfield. An old stone culvert conveyed the water along South Street to Gallowbarrow where, joined by another small beck, it turned towards the river, following the western side of Low Sand Lane. The outlet into the Derwent may still be seen today, pouring drainage water from this area of the town into the river. Of the site where now stand the buildings and concrete yards of the mart, Bolton wrote in 1912 "Many of my readers will remember the tarn and the willows that grew beside it".[13]

A Cockermouth meteorologist, H. Dodgson, kept records for the town for the fifteen years (1862-76) [14] and we may compare his readings with those made at the Grammar School for the twelve years (1966-77), 100 years later. The average annual rainfall for the two periods respectively was 44.5 in [1130 mm] and 42.0 in [1070 mm], the mean temperature 48.6 and 47.7 °F, showing little difference. Over ten of Dodgson's years, Cockermouth's rainfall was 44 inches, while Whinfell Hall had 55 and Keswick 62, showing how the town benefits from not having high land on the side of the prevailing winds. Moving further from the hills Silloth had 34 inches and Carlisle 29.

Dodgson had the temperature figures for Greenwich for his period of observation, which showed London to be 1.5 °F warmer than Cockermouth in June-August, but 2 or 3 °F colder in the months December-February. The result of being only seven miles from the west coast is that the town does not experience excessive summer heat, but enjoys moderate winters. Contrary to popular belief about a place so far north, there was no snow recorded in six of the twelve years 1966-77![15]