

Lower Limestone Group, Dinantian, Carboniferous, Midland Valley of Scotland

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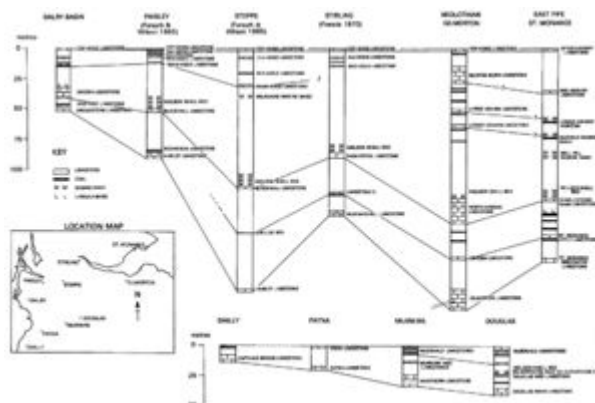
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Lower Limestone Group (now known as the Lower Limestone Formation)



Comparative generalised vertical sections of the Lower Limestone Group. P915529.

The Lower Limestone Group is the uppermost subdivision of the Dinantian in Scotland. It follows the Calciferous Sandstone Measures conformably, except in some marginal areas where it overlaps them and rests on older strata.

The marine influence, seen in its early phases in the upper part of the Calciferous Sandstone Measures, is more fully expressed in the Lower Limestone Group. The proportion of limestone in the sequence is greater in the Lower Limestone Group than it is in the other subdivisions of the Carboniferous, although it is still a relatively minor constituent.

The base of the Group is placed at the base of the Hurlet Limestone or its lateral equivalents. It is a widespread horizon and its correlation has been agreed over most of the region. The top of the Group is taken at the top of the Top Hosie Limestone. The latter is present in most outcrops in the Midland Valley and it can be recognised with little difficulty ([P915529](#)).

The group has its greatest development in the Midlothian-east Fife area where it is up to 220 m thick.

Lithology

The rock-types of the Lower Limestone Group consist principally of sandstone, mudstone, limestone and coals with root-beds. The sequence is cyclic and the marine members tend to be the best developed, most widespread and persistent horizons.

The sandstones, which are the most prevalent rock-type in the thicker parts of the outcrop, are mainly fine- or medium-grained and grey or pale yellow in colour. However, coarser, locally pebbly, sandstones occur which may represent channel-fill deposits.

The argillaceous strata are dark grey, silty and contain thin ironstone bands which were worked to a small extent. Mudstones occurring above and below the limestone horizons tend to be marine and at several horizons contain varied marine faunas dominated by brachiopods and molluscs.

The limestones occur in beds up to 20 m thick but are commonly much thinner. They tend to be hard, argillaceous, grey limestones, which, at some horizons, have a conspicuous fauna of corals, brachiopods and crinoids. Some are partially dolomitised locally. The limestones normally contain a marine fauna, but the lower part of the Blackhall Limestone in the Glasgow area contains a fauna of ostracods and fish-debris and has been described as non-marine.

Coal seams were developed irregularly, but a few were thick enough to have been worked to some extent in parts of the Central Coalfield and in Midlothian and Fife. The Lillies Shale Coal in the Glasgow area was worked at one time as an oil-shale.

Lateral variation

Major variations in thickness in the Lower Limestone Group can be attributed to differential subsidence in basinal areas whose disposition is controlled to some extent by the presence of thick lava piles in the Calciferous Sandstone Measures. In addition there was differential subsidence across lines of faulting particularly in Ayrshire, and overlap and attenuation occurred at the limits of the depositional area.

The greatest accumulation of sediment occurred in the Central Coalfield- Kincardine basin area and in the Midlothian-east Fife basin, where thicknesses up to 220 m are known. These two areas are separated by a NNE-trending zone of relative thinning called the Burntisland Anticline, which coincides with and is probably a consequence of a thick pile of lavas which extends from the Calciferous Sandstone Measures up into the Upper Limestone Group. The Lower Limestone Group sediments in the Central Coalfield-Kincardine basin area show marked attenuation towards the arcuate outcrop of the Clyde Plateau lavas extending from the Kilsyth Hills to Greenock and south-eastwards to Strathaven. At least part of the high ground between the Central and Ayrshire coalfields was an area of non-deposition.

In Ayrshire the strata are seldom over 60 m thick and variations in thickness are abrupt and coincident with north-easterly trending lines of faulting. In the Dairy Basin in the north the sediments are up to about 60m thick, but are locally thinned by overlap against the eroded surfaces of the Clyde Plateau lavas. The thickness is reduced to between 20 and 30 m on the south side of the Dusk Water Fault. Between the Dusk Water Fault and the Inchgotrick Fault the strata increase in thickness southwards to about 50 m, but thin towards the north-east and are cut out by overlap

against the lavas north of Galston.

In the area on the south side of the Inchgotrick Fault the strata are thin in the west and absent further east. The strata, where present, are not only thin but parts of the succession are missing either through non-deposition or contemporaneous erosion. The area to the south of Ayr is thought to have been emergent during Lower Limestone Group times.

The Kerse Loch Fault is also a line of faulting across which there is an abrupt increase in thickness. The thickness north of the fault varies between 6 and 12 m and south of the fault it is between 16 and 22m.

In the Central Coalfield similar differential subsidence is thought to have occurred on the south side of the Campsie Fault.

The lithological variation in the Lower Limestone Group is considerable and is to some extent linked to the pattern of subsiding basins. The proportion of sandstone in the sequence is greater in areas of greater thickness, and in thinner sequences the limestones and shales are more prominent.

Lateral variation also occurs in the composition of the marine faunas which may be dependent on their lithological association, which in turn relates to the pattern of differential subsidence. Certain species occur only in areas of reduced sedimentation which were receiving deposits mainly of calcareous shales and limestones and these species apparently did not occur in the main areas of subsidence where there was a great proportion of clastic material laid down.

Contemporaneous volcanic rocks

Volcanic rocks occur in the Lower Limestone Group succession in parts of West Lothian and Fife. Between Bo'ness and Bathgate the sequence is made up almost entirely of basalt lavas and tuffs with some sedimentary intercalation including limestones. Part of the sequence in the Kinghorn area of Fife is also taken up by lavas and tuffs.

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