
The limestones of Scotland v.1 — Chapter 2 Stratigraphical distribution

In Scotland limestone occurs in many different geological formations. Questions of geological correlation, that is, whether a bed of limestone known in one area is the same as, or different from, a bed of limestone found elsewhere, are important for two reasons.

The first reason is that individual beds of limestone do not usually vary rapidly in lithology and chemical composition from place to place, and so the character of a limestone can often be inferred in the first instance from the fact that it is the same bed as a limestone which is well known elsewhere. Thus, the Burdiehouse Limestone, which is of high quality, occurs in a certain position in the Oil Shale sequence, is of freshwater origin, is of rather distinctive appearance in hand specimen, is largely composed—in some beds at least—of ostracods and is associated with very typical kinds of plant impressions. If, then, we deduce from such geological evidence that the limestone found in a given spot is the Burdiehouse we are justified in going to some trouble to investigate it. Again, Group II of the Durness Limestone is composed of dolomite at Durness, Eireboll, Assynt, Kishorn, and in Skye, indeed wherever it is found, whereas Group V is mainly limestone both at Durness and in Skye. On the other hand, differences are often found when the limestones of one group of strata are compared with those of another. For example, the cornstones of the Old Red Sandstone are usually non-argillaceous and low in magnesia. In contrast, the cementstones of the Calciferous Sandstone Series usually contain a considerable percentage of magnesia and sometimes also an appreciable amount of iron.

The second reason for correlating beds of limestone is that it enables the whereabouts of a given limestone to be deduced by applying knowledge as to its position in the stratigraphical sequence. In Midlothian, for example, there is a series of limestones in the Lower Limestone Group of the Carboniferous, and the chief limestones from above downwards are the Bilston Burn, the North Greens and the Gilmerton. Hence if a limestone outcrop is known to be that of the North Greens, the Bilston Burn Limestone will be found above it and the Gilmerton Limestone below it. If, in another place, a coal seam is found which is known to be the North Greens Coal, our knowledge of the general stratigraphy will lead us to look for the North Greens Limestone a short distance higher in the sequence. By following this principle it is often possible to trace the position of a limestone with considerable confidence even where it does not appear at the surface for many miles.

It will be seen from the sections dealing with the chemical and petrographical characters of the Scottish limestones that despite all their variability the stratigraphical factor cannot be ignored, and indeed that a stratigraphical grouping is essential to any profitable discussion of the subject. The limestone-bearing formations are given in (Table 1), pp. 6 and 7, together with the types of limestone occurring in them and some indication of the areas in which they are to be found.

In the case of formations other than the Carboniferous the individual limestones in any one group of strata are comparatively few in number and their distribution throughout the various counties is adequately indicated in the table. In the Carboniferous, however, there are so many separate limestones that a more detailed treatment is required. The limestones of Dumfriesshire (except Sanquhar) and Roxburghshire have not been fully surveyed in detail, and it is only possible to say that they belong to the lower part of the Carboniferous sequence, without specifying their exact positions. Throughout the Midland Valley, on the other hand, from north and central Ayrshire through Lanarkshire and Stirlingshire to Fife and the Lothians, it is possible to trace the greater number of individual beds with a high degree of confidence.

In the Carboniferous rocks of the Midland Valley, limestone is confined to the lower half of the Carboniferous, and for the most part to the Upper and Lower Limestone Groups. (Table 2), pp. 8 and 9, gives some idea of the distribution of limestone in these strata and an indication of the areas in which they are well developed. Only limestones which have had, or may have, some economic significance are included.

There are some calcareous rocks in nearly every part of Scotland, but limestone in sufficient quantity and of good enough quality to repay attention from the economic point of view is limited to definite belts of country. Three different provinces may be distinguished (see (Plate 2)), namely (1) Southern Scotland and the Midland Valley, or the province of the Carboniferous limestones, (2) The Grampian and South-West Highlands, or the province of the Crystalline Metamorphic

limestones, and (3) Northern and North-Western Scotland, or the province of the Cambrian and Jurassic limestones.

Southern Uplands

The Southern Uplands, including the counties of Wigtown, Ayr (southern portion), Kirkcudbright, Dumfries, Roxburgh, Selkirk, Peebles (except the extreme northern end) and Berwick, are very poor in limestone. The Stinchar Limestone of south Ayrshire is the only bed of outstanding importance, though several of the Carboniferous limestones of the borders, such as those in the Liddesdale and Carham areas of Roxburghshire are of potential value.

Midland Valley

The Midland Valley contains many limestones in the Carboniferous belt stretching from Ayrshire through Lanarkshire and Stirlingshire to the Lothians and Fife. These have been so very freely used in the past that future exploitation must inevitably be chiefly by mining. The individual beds of limestone are mostly thin, however, and the quality, though excellent in one or two cases, is in general only moderate. There is a development of thick limestones in the Midlothian district, and these are worked by mining. The north-eastern part of the Midland Valley, from central Stirlingshire through south-east Perthshire to Angus and Kincardine, is almost devoid of limestones. Bute and Arran also have very little.

In the Highlands the distribution of limestone is irregular. The South-West Highlands and Islands, which lie almost entirely in Argyllshire (Figure 3), have a considerable development of metamorphic limestone in the mainland area south-east of the Firth of Lorne. The Loch Tay Limestone runs almost the whole length of Kintyre, the Tayvallich Limestone shows extensive outcrops south of Loch Awe, and the Ballachulish and associated limestones are well developed on the east side of Loch Linnhe and on Lismore and Shuna. Islay has extensive limestone tracts, but there is none on Jura. The portion of Argyll west of the Firth of Lorne has less in the way of calcareous beds, and the same applies to Mull and the other islands off the north-west Argyllshire coast.

Central Highlands

The main deposits of limestone in the Central Highlands are the Loch Tay Limestone and the Blair Atholl Limestones. The Loch Tay Limestone traverses central Perthshire in a north-easterly direction from Crianlarich to Pitlochry and Kirkmichael and continues into Angus in the vicinity of Glen Isla. It is generally of moderate quality and is accessible in the vicinity of all the main through roads. Farther northeast the Deeside Limestone, well exposed in the neighbourhood of Aboyne and Banchory, is generally accepted as the stratigraphical equivalent of the Loch Tay Limestone, but is of much lower grade.

The Blair Atholl Limestones, which are often of excellent quality, crop out in central and north-eastern Perthshire. From Blair Atholl itself they continue up Glen Tilt, thence eastwards to the Perthshire-Aberdeenshire march at the Devil's Elbow and then northwards to Braemar. Considerably farther north they are almost certainly represented by the limestones of the Sandeud Group in Banffshire (*see below*).

North-East Highland and Moray Firth

In the North-East Highland and Moray Firth areas the limestones of the Sandeud Group form a well-defined zone yielding high-quality stone along most of its long outcrop. The Group runs from Tomintoul right through Banffshire via Keith to the Portsoy neighbourhood, passing on its way through the part of Aberdeenshire north-west of Huntly. The rest of Aberdeenshire is notably poor in limestone. Moray, Nairn, and the greater part of Inverness contain nothing of value, but around Fort William and in the Loch Laggan area extensions of the Ballachulish limestone-zone of northern Argyllshire are present and are of great importance.

Northern and North-Western Scotland

In Northern and North-Western Scotland the principal stretch of the mainland from western Inverness through the eastern part of Ross, Cromarty and eastern Sutherland into Caithness is composed largely of Moine and associated rocks in which limestone is rare. West of this, however, from the south end of Skye through Kishorn in Wester Ross to Ullapool and thence by Assynt to Durness and Eireboll, there is a good development of calcareous beds. These mainly belong to the Cambrian (and Ordovician) strata which are composed of limestone and dolomite through the greater part of their thickness. Owing to the geological structure, however, the calcareous beds are not continuous throughout this belt of country but are chiefly developed in four areas, namely, in southern Skye (Broadford and Ord), in the south-west corner of Wester Ross (Kishorn), in the Assynt district (Elphin and Inchnadamph) and in north-west Sutherland (Durness and Eireboll). In each of these areas there are enormous amounts of dolomite. In addition there is abundance of non-dolomite limestone in Skye and at Durness.

Crystalline metamorphic limestones are found in the Loch Maree district of Wester Ross. In Skye and the west coast of Ross there is limestone in the Jurassic rocks, but only in one or two areas (Broadford and Applecross) could it be considered of possible economic value, and even there only in a small way.

Western and Northern Isles

In the Western and Northern Isles there is in general little limestone apart from shell sand. As far as is known, there is not a single workable bed in the Outer Hebrides, and there is no limestone worthy of the name in Orkney. In Shetland, however, the mainland is traversed in a north and south direction by a series of thick limestone zones, each many miles in length. There is also limestone in several of the smaller Shetland isles. In character the Shetland limestones are metamorphic. They are only of moderate quality.

Shell Sand

Along the whole eastern coast of Scotland from Berwick to Wick there is hardly a single deposit of sand shelly enough to be of in the Firth of Clyde and Solway areas of the west coast. In contrast with this the Atlantic seaboard contains many bays in which larger or smaller deposits of varying, but locally useful, lime content are to be found. Such sources are used to some extent both in the Outer Hebrides and elsewhere. In addition to shell sand of the usual type there are in one or two places, and particularly round the Isle of Skye, coastal deposits of nullipore sand, of which that at Claigan near Dunvegan may be taken as an example. In Orkney shell sand is the only local calcareous material of any value. Deposits are rather numerous in the various islands of the group, but the quality is not usually high owing to admixture of ordinary sand. In Shetland shell sand is not in general of importance, though a fairly extensive stretch is to be found at the south end of the mainland near Sumburgh, and there is another at the north end of Yell.

The most important deposit of shell sand so far found in Scotland, however, is at John o' Groat's, in Caithness, where a very extensive accumulation is to be found with an average calcium carbonate content of over 90 percent.

TABLE I
CLASSIFICATION AND DISTRIBUTION OF SCOTTISH LIMESTONE

Main Divisions	Subdivisions	Character of Calcareous Beds	Distribution
RECENT AND PLEISTOCENE		Lake Marl Calcareous tufa Shell Sand	Caithness (Westfield, etc.), Inverness (Dochfour) Wester Ross (Kishorn) Caithness (John o' Groat's), Orkney, Shetland, Outer Hebrides, etc. Skye (Strollaness) Sutherland (E. coast)
CRETACEOUS	Chalk Kimmeridge and Biron Arenaceous Series Great Estuarine Series Lias	Limestone (altered chalk) Impure Limestone	Edg. Skye (Strollan, Strathaird) Skye (Broadford), Wester Ross (Applecross), Argyll (Loch Alna, Ardnamurchan)
JURASSIC		Limestone, mainly shelly Shelly Limestone, usually rather sandy	Edg. Skye (Strollan, Strathaird) Skye (Broadford), Wester Ross (Applecross), Argyll (Loch Alna, Ardnamurchan)
RHARTIC TRIASSIC		Sandy Limestone Concretions Numerous Limestones, usually shelly, including the Castiary and Calny near the top of the formation and the Bilston Barn, Blackhall (Charlestown Main, North Greens) and Hurlet (Main, Dockra, Gilmerston) near the base	Argyll (Mull) Argyll (Mull, Morvern) Fife, Kinross, the Lothians, Stirling, Peebles, Lanark, Ayr, Renfrew, Dumfries
CARBONIFEROUS (see Table II for details)	Carboniferous Limestone Series		
	Calcareous Sandstone Series	Marine Limestones near the top of the formation, including the Broadstone and Hollybush Freshwater Limestones in the Oil Shale Group, including the Burdhouse Cementstones, near the base of the formation	N. Ayr, Renfrew, Lanark, Stirling, E. Lothian Fife, Midlothian, W. Lothian, E. Lothian Dumbarrow, Stirling, Fife, Roxburgh, Berwick
OLD RED SANDSTONE	Upper Old Red Sandstone Middle Old Red Sandstone	Concretions, nodular non-fossiliferous fine-grained limestones Tufaceous and other limestones, usually impure	Angus (Brechin), Kinross (Vanó), Bute (Kilchattan), Ayr, Argyll, Stirling (Gargunnoch) Caithness (Achvassada)
ORDOVICIAN		Limestone, fossiliferous	Ayr (Gárvan)
CAMBRIAN	Durness Limestone :-	Dolomite and Limestone (Upper part probably Ordovician)	Sutherland (Durness)
	VII Durine Group VI Croisaphuill Group	Dolomite and Limestone Dolomite and Limestone	Sutherland (Durness), Skye (Broadford)
	V Balnakeil Group	Mainly Limestone	Sutherland (Durness), Skye (Broadford)
	IV Sangoonee Group III Sailmhor Group II Eilean Dubh Group	Dolomite and Limestone Mainly Dolomite Mainly Dolomite	Sutherland (Durness), Skye (Seat) Sutherland (Durness, Eireboll, L. Assynt, Elphin), Ross (Ullapool, Kishorn), Skye (Seat) Sutherland (Durness, Eireboll, L. Assynt), W. Ross (Kishorn)
	I Gárvan Group	Mainly Dolomite	Sutherland (Durness, Eireboll, L. Assynt), W. Ross (Kishorn)
		Ballachulish Limestone Appin Limestone Lismore Limestone Islay Limestone Tayvallich Limestone Shiea Limestone Loch Tay Limestone	Crystalline Metamorphic Limestone " " " " " " " " " " " " " " " " " "
DALRADIAN (The sequence being uncertain, the limestones are arranged regionally instead of stratigraphically)	Blair Atholl Limestones Limestones of Eastern Inverness Limestones of Sandend Group (probably Blair Atholl Limestones) Limestones of Portsoy Group Boyne Limestone Deeside Limestone (probably Loch Tay Limestone)	" " " " " " " " " " " " " " " " " "	Perth (White Bridge, Blair Atholl, Glen Tilt, Glen Shee), Aberdeen (Bessans) Inverness (Kinlochlaggan, Aviemore) Banff (Keith, Dufftown, Tomintoul) Banff (Keith), Aberdeen (Muntly) Banff (Portsoy) Aberdeen (Ballater, Aboyne), Kincairdine (Banchory)
TORRIDONIAN MOINE		Banded sandy Limestone Lenticular beds of Crystalline Metamorphic Limestone	Argyll (Colonsay) Sutherland (Shines), Inverness (Rebag, ? Foyers)
SHETLAND METAMORPHIC SERIES LEWISIAN		Zones of Crystalline Metamorphic Limestone Lenticular beds of Crystalline Metamorphic Limestone	Shetland (Voe, Whiteness, Grista) W. Ross (L. Maree), Argyll (Coll, Tirre) Inverness (Glen Elg, Glen Donnary, Glen Urquhart)

Table 1 Classification and distribution of Scottish limestone.

TABLE II
SYNONYMY AND DISTRIBUTION OF THE PRINCIPAL SCOTTISH CARBONIFEROUS LIMESTONES

Geological subdivisions	LIMESTONES Principal names in capitals, synonyms inset	Counties	DISTRIBUTION Localities	
UPPER LIMESTONE GROUP	CASTLECARY	Dumbaron Fife	Castlecary, Cumbernauld, Luggiebank Culross	
	Craigenbock	W. Lothian	Kinnell, Carrubber	
	Levensat	Midlothian	Breoch	
	Vicar's Bridge	Clackmannan Fife	Vicar's Bridge Westmuir	
	CALMY	Ayr Lanark Dumbaron Fife	New Cumnock Quarter, Garthkirk, Clayston, Robroyton Cumbernauld Saline, Culross	
	Dykenock	W. Lothian	Kinnell, Carrubber	
	Blue Tour	Ayr	Muirkirk	
	Beaston	Ayr	New Cumnock	
	Upper Linn	Ayr	Dalry	
	Gair	Lanark	Larkhall, Carluke, Auchinheath	
	Gill	Lanark	Douglas	
	Arden	Renfrew	Darnley	
	ORCHARD	Renfrew	Giffnock	
	Lower Linn	Ayr	Dalry	
	LYONCROSS	Renfrew	Washmill	
Keils	Ayr	Wateride		
LIMESTONE COAL GROUP	INDEX	Ayr Lanark Dumbaron Ayr	Muirkirk, New Cumnock, Sorn Forth, Coalburn Dullistur Kilwinning	
	Highfield			
	A few Limestones, all thin and impure			
	ROSLIE (Limestones of the Roslie Group)	Lanark Renfrew Lanark	Haywood, Carluke Johnstone E. Kilbride	
	Calderwood Cement	Lanark	E. Kilbride	
	Ayril, Middle and Under			
	Hairmyres	Lanark	E. Kilbride	
	Macdonald	Ayr	Muirkirk, Dalhousie, Peabreck	
	Bilston Burn	Midlothian	Esperston	
	LOWER LIMESTONE GROUP	Mid Kinmy	Fife	Luscar
		BLACKHALL	Renfrew Lanark	Luscar Hurler
		Foul Hosié	W. Lothian	Carluke, Auchinheath
		Peterhill	Peebles	Bathgate
		North Greens	Midlothian E. Lothian Fife	Macbethill Cousland, D'Arcy, Pathhead, Middleton, Mount Lothian Skateraw, Saltoun Charlestown, Inverkeithing, Culca, Lomond Hills, Leslie, Roscobie, Chapel etc.
		Charlestown Main		
LONG CRAIG UPPER, HURLET or MAIN		Kircos E. Lothian Ayr Lanark	Bishop Hill Harelaw, Orwell Mains, Gladsmuir, Saltoun Patna E. Kilbride, Carluke, Wiltontown, Auchinheath, Strathaven, Lesmahagow, Douglas, etc.	
Hawthorn		Dumbaron	Balfray	
Dockra		Renfrew	Paibley, Johnstone, Houston, Hurler	
Carris		Stirling	Lennoxtown, Cambusbarrow, Sauchie	
Gilmerton		Ayr	Sorn, Glenbock, Muirkirk, Glenmuir, Peabreck, New Cumnock	
Charlestown Station		Renfrew	Dalry, Beith, Lugton, Inchotrick	
Limestones (unassociated) of Lower Limestone and Upper Calciferous Sandstone age		Renfrew	Cock of Arras, Corrie, Brodick	
BALDERNOCK		Peebles Midlothian E. Lothian Fife	Cardle, Machintosh Gilmerton, Middleton, Mount Lothian Saltoun Lomond Hills, Little Raith, Kinghorn	
BROADSTONE		Dumfriesshire	Thorhill, Ecclefechan, Kelhead, Harelawhill	
HOLLYBUSH	Stirling	Glorat		
BURDIEHOUSE	Ayr	Dalry		
Other limestones in Oil Shale Group	Ayr	Beith, Dalry		
CEMENTSTONES	Renfrew	Johnstone		
Individual beds not traceable over large areas	Renfrew Lanark W. Lothian Midlothian Fife	Limecraigs, etc., Barrhead Lesmahagow Hopetoun Straiton, Harburn, E. Calder Burnside, Rosyth E. Linton, N. Berwick, Whittinghame		
CALCIFEROUS SANDSTONE SERIES	Other limestones in Oil Shale Group	E. Lothian		
	CEMENTSTONES	Roxburgh Dumbaron Stirling Midlothian Fife	Newcastleton, Carham Dumbaron Ballagan West Calder Devonshaw, Randerstone, Crail, Anstruther	
	Individual beds not traceable over large areas			

Table 2 Synonymy and distribution of the principal Scottish Carboniferous limestones.



Plate 2 Map of the Main Occurrences of Limestone in Scotland.

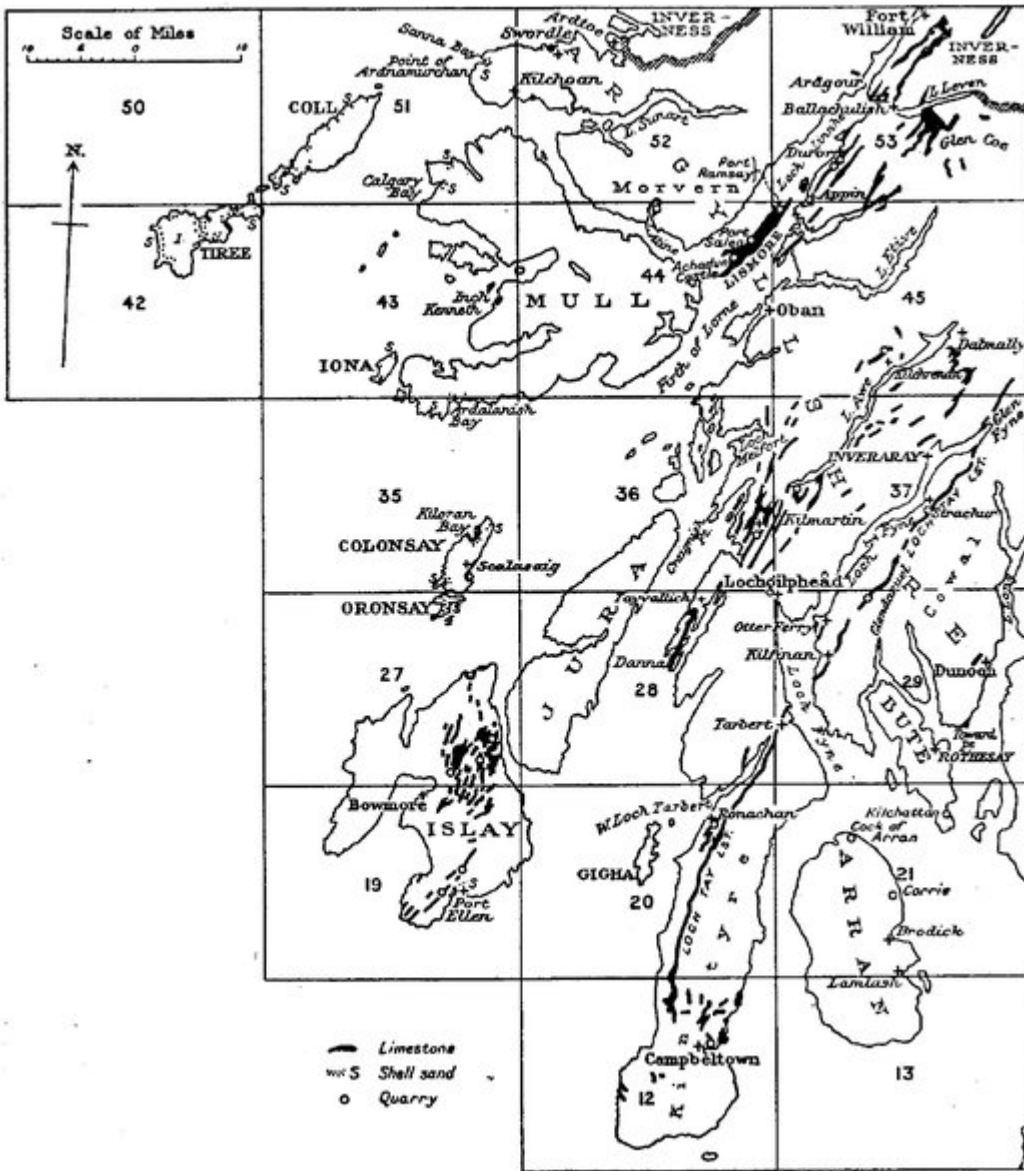


Figure 3 Sketch map showing distribution of limestone in the counties of Argyll and Bute.