

# Summary of the geology, Midland Valley of Scotland

From Earthwise

[Jump to navigation](#) [Jump to search](#)

Cameron, I B, and Stephenson, D. 1985. British regional geology: The Midland Valley of Scotland. Third edition. Reprint 2014. Keyworth, Nottingham: British Geological Survey.

## Summary of the geology



Summary of the geology of the Midland Valley. P915513.

The region has the structure of an ancient rift valley with the parallel Highland Boundary and Southern Upland faults forming the limits to the area. The downfaulted strip between the two faults is floored by rocks mainly of Devonian and Carboniferous age. Comparatively small inliers of Lower Palaeozoic rocks occur on the south side of the region and rocks of Permian age occur in central Ayrshire.

Sedimentary rocks of Devonian and Carboniferous age underlie about 36 and 38 per cent respectively of the area of the Midland Valley. Igneous rocks, mainly of Devonian and Carboniferous age form about 21 per cent of the area. The geology is summarised in [P915513](#).

The oldest exposed rocks are the Ordovician and Silurian sandstones, mudstones and conglomerates which occur as inliers in the Lesmahagow area, the Pentland Hills and in south Ayrshire. An upward passage from marine strata to terrestrial fluvial rocks in the Silurian is followed by the semi-arid fluvial clastic sediments of the Lower Devonian.

Great thicknesses of red and grey sandstones and conglomerates with contemporaneous piles of lava were deposited during the Lower Devonian, particularly in the north-eastern part of the area. These rocks are well exposed on the coast from the Tay estuary north to Stonehaven, and the lavas form the Ochil and Sidlaw hills.

Following deposition of the Lower Devonian rocks there was a period of uplift, folding, faulting and erosion. Important fault movements occurred on the boundary faults in Middle Devonian times and probably during the Lower Devonian. No sediments of Middle Devonian age are known in the Midland Valley.

Red sandstones and siltstones of Upper Devonian age were laid down on a peneplaned surface in the eastern and southern parts of the area, but in the west coarser sediments, the result of more vigorous erosion in an area of greater relief, accumulated in considerable thicknesses. Prolonged

periods of caliche-type soil formation resulted in the development of concretion stones particularly in the upper part of the division.

In the Carboniferous Period there was a climatic change to humid equatorial conditions and a large fluvio-deltaic complex of continental dimensions developed in which large quantities of sand and mud were deposited at or near sea level. Occasional flooding by the sea caused deposition of thin limestones and calcareous mudstones, and luxuriant forest growth on emergent delta-top surfaces ultimately became coal seams. The Highlands and Southern Uplands remained, in part at least, above the level of deposition. Igneous activity occurred more or less throughout the period at one locality or another and large quantities of basalt lava were extruded, particularly in the lower part of the succession.

Differential movement during the Carboniferous on fractures in the basement caused notable variation in thickness within the region, probably exerted control on the location of the igneous rocks and accounts for local unconformities and non-sequences.

Coals, ironstones, limestones and oil-shales, which have been extensively worked, formed the basis of the industrialisation of the Midland Valley during the nineteenth and first part of the twentieth centuries.

In central Ayrshire, Permian strata overlie the Carboniferous rocks and indicate that the climate had reverted to arid conditions. The strata consist of basalt lavas with intercalated sediments overlain by red wind-deposited sandstones. The dry climate of the Permian is believed to be responsible for the deep oxidation and reddening of the upper part of the Carboniferous and there is an hiatus in the sedimentary sequence between the Carboniferous and the Permian.

The Permian sandstones are the youngest sedimentary rocks present in the Midland Valley, but Triassic strata occur in Arran and floor much of the Firth of Clyde between Arran and Northern Ireland. Fragments of Lias and Cretaceous strata within the central complex in Arran and the Lias and Cretaceous outcrops in Northern Ireland suggest that Mesozoic rocks may at one time have encroached upon parts of the Midland Valley. Triassic and Cretaceous rocks also occur in the Forth Approaches.

Dykes associated with the Tertiary volcanic centres of Mull and Arran are intruded into the strata of the Midland Valley and are the most recent solid rocks in the area. Erosion during the Tertiary and glaciation during the Quaternary combined to create the present landscape.

## **Bibliography**

Bremner, A. 1942. The origin of the Scottish river system. *Scot. Geogr. Mag.*, Vol. 58, pp. 15-20, 54-59, 99-203

George, T. N. 1960. The stratigraphical evolution of the Midland Valley. *Trans. Geol. Soc. Glasgow*, Vol. 24, pp. 32-107.

George, T. N. 1965. The geological growth of Scotland. In *The geology of Scotland* (1st edition), pp. 1-48. Craig, G. Y. (editor). (Edinburgh: Oliver and Boyd.)

Harland, W. B., Cox, A. V., Llewellyn, P. G., Pickton, C. A. G., Smith, A. G. and Walters, R. 1982. A geologic time scale. (Cambridge: Cambridge University Press.)

Linton, D. L. 1951. Problems of Scottish scenery. *Scot. Geogr. Mag.*, Vol. 67, pp. 65- 85.

Mackinder, H. J. 1902. Britain and the British seas. (London: Heinemann.) Smith, A. G., Hurley, A. M. and Briden, J. C. 1981. Phanerozoic palaeocontinental world maps. (Cambridge: Cambridge University Press.)

## **General references on the Midland Valley**

Anderton, R., Bridges, P. H., Leeder, M. R. and Selwood, B. W. 1979. A dynamic stratigraphy of the British Isles. (London: George Allen and Unwin.)

Bluck, B. J. (editor). 1973. Excursion guide to the geology of the Glasgow district. (Glasgow: Geological Society of Glasgow.)

Bowes, D. R. and Leake, B. E. (editors). 1978. Crustal evolution in northwestern Britain and adjacent regions. Spec. Issue Geol. J., No. 10.

Craig, G. Y. (editor). 1983. Geology of Scotland (2nd edition). (Edinburgh: Scottish Academic Press.)

Craig, G. Y. and Duff, P. Mcl. D. (editors). 1975. The geology of the Lothians and south-east Scotland. An excursion guide. (2nd edition). (Edinburgh: Scottish Academic Press.)

Eyles, V. A., Simpson, J. B. and Macgregor, A. G. 1949. The Geology of Central Ayrshire. Mem. Geol. Surv. G.B.

Forsyth, I. H. and Chisholm, J. I. 1977. The geology of east Fife. Mem. Geol. Surv. G.B.

Francis, E. H., Forsyth, I. H., Read, W. A. and Armstrong, m. 1970. The geology of the Stirling district. Mem. Geol. Surv. G.B.

George, T. N. 1960. The stratigraphical evolution of the Midland Valley. Trans. Geol. Soc. Glasgow, Vol. 24, pp. 32-107.

Harris, A. L., Holland, C. H. and Leake, B. E. (editors). 1979. The Caledonides of the British Isles — reviewed. Spec. Publ. Geol. Soc. London, No. 8.

Macgregor, A. R. 1973. Fife and Angus geology. An excursion guide. (2nd edition). (Edinburgh: Scottish Academic Press.)

Macgregor, M., Dinham, C. H., Bailey, E. B. and Anderson, E. m. 1925. The geology of the Glasgow district. (2nd edition). Mem. Geol. Surv. G.B.

Mitchell, G. H. and Mykura, W. 1962. The geology of the neighbourhood of Edinburgh. (3rd edition). Mem. Geol. Surv.

G.B. Richey, J. E., Anderson, E. M. and Macgregor, A. G. 1930. The geology of north Ayrshire. Mem. Geol. Surv. G.B.

Sutherland, D. S. (editor). 1982. Igneous rocks of the British Isles. (Chichester: Wiley.)

Retrieved from

[http://earthwise.bgs.ac.uk/index.php?title=Summary\\_of\\_the\\_geology\\_of\\_the\\_Midland\\_Valley\\_of\\_Scotland&oldid=34751](http://earthwise.bgs.ac.uk/index.php?title=Summary_of_the_geology_of_the_Midland_Valley_of_Scotland&oldid=34751)

Category:

- [Midland Valley of Scotland](#)

## Navigation menu

### Personal tools

- Not logged in
- [Talk](#)
- [Contributions](#)
- [Log in](#)
- [Request account](#)

### Namespaces

- [Page](#)
- [Discussion](#)

### Variants

### Views

- [Read](#)
- [Edit](#)
- [View history](#)
- [PDF Export](#)

### More

### Search

### Navigation

- [Main page](#)
- [Recent changes](#)
- [Random page](#)
- [Help about MediaWiki](#)

### Tools

- [What links here](#)
- [Related changes](#)

- [Special pages](#)
- [Permanent link](#)
- [Page information](#)
- [Cite this page](#)
- [Browse properties](#)

• This page was last modified on 1 February 2018, at 13:00.

- [Privacy policy](#)
- [About Earthwise](#)
- [Disclaimers](#)

