

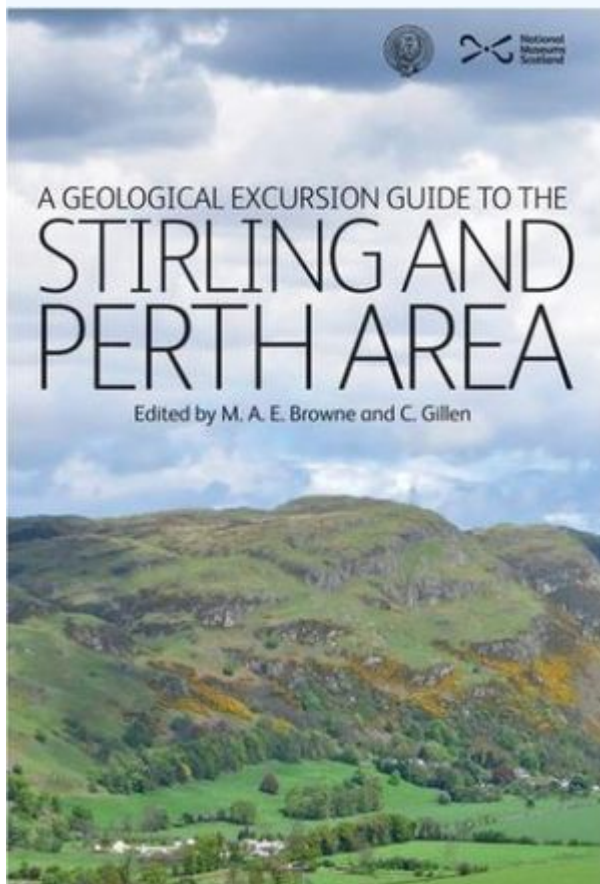
# Geological excursion guide to the Stirling and Perth area

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## Editorial introduction

This field guide has had a long history since the idea was mooted in the 1970s, and many of the excursions had been drafted by the end of the 1980s. We have taken the opportunity when editing the text and revisiting all the exposures to remove out-of-date references and add the most-recent research results and concepts. Some localities had degraded to the extent that we could not justify retaining them in the guide. In addition, we were obliged to remove some excursions entirely, as a result of restrictions on the overall size of the book. All national grid references are based on GPS readings taken at the time of our visits. Since this is a field guide, readers wishing to have overviews of the geology and landscapes are referred to the following works: Cameron & Stephenson (1985), Browne & Mendum (1995), Trewin (2002), McKirdy et al. (2009), Friend (2012), Gillen (2013). The Stirling Memoir (Francis et al., 1970) and the Perth Memoir (Armstrong et al., 1985) are key references for most of the more detailed geology and are referred to separately only in chapters where there is a specific reason.

## References

- AITKEN, A. M. and SHAW, A. J. (1983): The sand and gravel resources of Strathallan, Tayside Region, *Mineral Assessment Report of the Institute of Geological Sciences*, No. 122.
- ARMSTRONG, M. and PATERSON, I. B. (1970): The Lower Old Red Sandstone of the Strathmore Region, *Institute of Geological Sciences Report*, No. 70/12.
- ARMSTRONG, M., PATERSON, I. B. and BROWNE, M. A. E. (1985): *Geology of the Perth and Dundee District*, Memoir of the British Geological Survey, Sheets 48W, 48E and 49 (Scotland).
- BARCLAY, W. J., BROWNE, M. A. E., MCMILLAN, A. A., PICKETT, E. A., STONE, P. and WILBY, P. R. (2005): *The Old Red Sandstone of Great Britain*, Geological Conservation Review Series, No. 31 (Peterborough: Joint Nature Conservation Committee).
- BELT, E. S., FRESHNEY, E. C. and READ, W. A. (1967): Sedimentology of Carboniferous Cementstone Facies, British Isles and Eastern Canada, *Journal of Geology*, 75, pp. 711-21.
- BLUCK, B. J. (1990): Terrane provenance and amalgamation: examples from the Caledonides, *Philosophical Transactions of the Royal Society of London*, A 331, pp. 599-609.
- BLUCK, B. J. (2010): The Highland Boundary Fault and the Highland Border Complex, *Scottish Journal of Geology*, 46, pp. 113-24.
- BLUCK, B. J. (2011): Reply to the discussion by Tanner on 'The Highland Boundary Fault and the Highland Border Complex', BLUCK (2010), *Scottish Journal of Geology*, 46, pp. 113-24, *Scottish Journal of Geology*, 47, pp. 89-93.
- BRADBURY, H. J., HARRIS, A. L. and SMITH, R. A. (1979): Geometry and emplacement of nappes in the Central Scottish Highlands, in HARRIS A. L., HOLLAND, E. H. and LEAKE, B. E. (eds): *The Caledonides of the British Isles - reviewed* (Special publications of the Geological Society of London), 10, pp. 213-20.
- BROWNE, M. A. E., DEAN, M. T., HALL, I. H. S., MCADAM, A. D. and MONRO, S. K. (1999): A review of the lithostratigraphy of the Carboniferous rocks of the Midland Valley of Scotland, *British Geological Survey Research Report*, No. RR/99/07.
- BROWNE, M. A. E., GRAHAM, D. K. and GREGORY, D. M. (1984): Quaternary Estuarine Deposits in the Grangemouth Area, Scotland, *Report of the Institute of Geological Sciences*, No. 16/3.
- BROWNE, M. A. E. and MCMILLAN, A. A., (1989): Quaternary geology of the Clyde valley, *British Geological Survey Research Report*, No. SA/89/1.
- BROWNE, M. A. E. and MENDUM, J. R. (1995): *Loch Lomond to Stirling: a landscape fashioned by geology* (Battleby, Perth: Scottish Natural Heritage).
- BROWNE, M. A. E., SMITH, R. A. and AITKEN, A. M. (2002): Stratigraphical framework for the Devonian (Old Red Sandstone) rocks of Scotland south of a line from Fort William to Aberdeen, *British Geological Survey Research Report*, No. RR/01/04.
- BURTON, P. W. and NEILSON, G. (1979): Earthquake swarms in Scotland - a current example, *Institute of Geological Sciences, Global Seismology Unit Report*, No. 113.

- CADELL, H. M. (1913): *The Story of the Forth* (Glasgow: James Maclehose & Sons).
- CAMERON, I. B., AITKEN, A. M., BROWNE, M. A. E. and STEPHENSON, D. (1998): *Geology of the Falkirk district*, Memoir of the British Geological Survey, Sheet 31E (Scotland).
- CAMERON, I. B. and STEPHENSON, D. (1985): *British Regional Geology: The Midland Valley of Scotland* (London: HMSO).
- CHISHOLM, J. I. (1966): An association of raised beaches with glacial deposits near Leuchars, Fife. *Bull. Geol. Surv. Gt. Br. 24* (Bulletin of the Geological Survey of Great Britain), pp. 163-74.
- CLARKSON, E. and UPTON, B. G. J. (2006): *Edinburgh Rock: the Geology of Lothian* (Edinburgh: Dunedin Academic Press).
- CLEAL, C. J. and THOMAS, B. A. (1996): *British Upper Carboniferous Stratigraphy*, Geological Conservation Review Series, No. 11, (Peterborough: Joint Nature Conservation Committee).
- COSSEY, P. J., ADAMS, A. E., PURNELL, M. A., WHITELEY, M. J., WHYTE, M. A. and WRIGHT, V. P. (2004): *British Lower Carboniferous Stratigraphy*, Geological Conservation Review Series, No. 29 (Peterborough: Joint Nature Conservation Committee).
- CRAIG, G. Y., McINTYRE, D. B. and WATERSTON, C. D. (1978): *James Hutton's Theory of the Earth: The Lost Drawings* (Edinburgh: Scottish Academic Press).
- DAVISON, C. (1924): *A history of British earthquakes*, 1st edition (Cambridge).
- DICKIE, D. M. and FORSTER, C. W. (eds) (1994): *Mines and Minerals of the Ochils* (2nd ed.) (The Research Group of the Clackmannanshire Field Studies Society).
- DINELEY, D. and METCALF, S. (1999): *Fossil Fishes of Great Britain*, Geological Conservation Review Series, No. 16 (Peterborough: Joint Nature Conservation Committee).
- DINHAM, C. H. and HALDANE, D. (1932): *The economic geology of the Stirling and Clackmannan Coalfield*, Memoir of the Geological Survey (Scotland), pp. 195-203.
- EVANS, D. J. A. (ed.) (2003): *The Quaternary of the Western Highland Boundary: Field Guide* (London: Quaternary Research Association).
- FORSYTH, I. H., HALL, I. H. S. and McMILLAN, A. A. (1994): *Geology of the Airdrie district*, Memoir of the British Geological Survey, Sheet 30E (Scotland).
- FORTEY N. J., PHILLIPS E. R. McMILLAN A. A. and BROWNE M. A. E. (1998): A geological perspective on the Stone of Destiny, *Scottish Journal of Geology*, 34, pp. 145-52.
- FRANCIS, E. H. (1982): Magma and sediment - 1. Emplacement mechanism of late Carboniferous tholeiite sills in northern Britain, *Journal of the Geological Society of London*, 139, pp. 1-20.
- FRANCIS, E. H. (1983): Magma and sediment - 2. Problems of interpreting palaeovolcanics buried in the strati-graphic column, *Journal of the Geological Society*, 140, pp. 165-83.
- FRANCIS, E. H., FORSYTH, I. H., READ, W. A. and ARMSTRONG, M. (1970): *The geology of the Stirling district*, Memoir of the Geological Survey of Great Britain, Sheet 39 (Scotland).
- FRIEND, P. (2012): *Scotland*, New Naturalist Guide (London: Harper-Collins).

- GEIKIE, A. (1897): *The Ancient Volcanoes of Great Britain*, vol. 1, (London: McMillan).
- GILLEN, C. (2013): *Geology and Landscapes of Scotland* (2nd ed.) (Edinburgh: Dunedin Academic Press).
- GOLLEDGE, N. R. (2010): Glaciation of Scotland during the Younger Dryas: A review, *Journal of Quaternary Science*, 25, pp. 550-66.
- GORDON, J. E. and SUTHERLAND, D. G. (1993): *Quaternary of Scotland*, Geological Conservation Review Series, No. 6, (London: Chapman & Hall for Joint Nature Conservation Committee).
- HALDANE, D. (1927): The Ochil Fault and its dolerite intrusion, *Summary of progress for 1926*, Memoirs of the Geological Survey, Scotland, pp. 147-53.
- HALL, I. H. S. AND CHISHOLM, J. I. (1987): Aeolian sediments in the late Devonian of the Scottish Midland Valley, *Scottish Journal of Geology*, 23, pp. 203-8.
- HALL, I. H. S., GALLAGHER, M. J. ET AL. (1982): Investigation of polymetallic mineralisation in Lower Devonian volcanics near Alva, Central Scotland, *Mineral Reconnaissance Programme Report of the Institute of Geological Sciences*, No. 53.
- HANSOM, J. D. and EVANS, D. J. A. (2000): The Carse of Stirling, *Scottish Geographical Journal*, 116, pp. 71-8.
- HARRIS, A. L., BRADBURY, H. J. and MCGONIGAL, M. H. (1976): The evolution and transport of the Tay Nappe, *Scottish Journal of Geology*, 12, pp. 103-13.
- HARRIS, A. L., FETTES, D. J. and SOPER, N. J. (1998): Age of the Grampian event: a discussion of new evidence that the Lower Cambrian Leny Limestone at Callander, Perthshire, belongs to the Dalradian Supergroup, and a re-assessment of the exotic status of the Highland Border Complex, *Geological Magazine*, 135, pp. 575-9.
- INESON, P. R. and MITCHELL, J. G. (1974): K-Ar isotope age determinations from some Scottish mineral localities, *Transactions of the Institute of Mining and Metallurgy (Section B: Applied Earth Sciences)*, 83, pp. 13-198.
- KOKELAAR, B. P. (1982): Fluidization of wet sediments during the emplacement and cooling of various igneous bodies, *Journal of the Geological Society of London*, 139, pp. 21-33.
- LAWSON, J. D. and WEEDON, D. S. (1992): *Geological Excursions around Glasgow and Girvan* (Glasgow: Geological Society of Glasgow).
- MCADAM, A. D. and CLARKSON, E. N. K. (1996): *Lothian Geology: An Excursion Guide* (Edinburgh: Edinburgh Geological Society).
- MACGREGOR, A. G. (1928): The classification of the Scottish Carboniferous olivine basalts and mugearites, *Transactions of the Geological Society of Glasgow*, 18, pp. 324-60.
- MCKIRDY, A., GORDON, J. and CROFTS, R. (2009): *Land of Mountain and Flood: The Geology and Landforms of Scotland* (Edinburgh: Birlinn for Scottish Natural Heritage).
- MCMILLAN, A.A., HAMBLIN, R. J. O. and MERRITT, J. W. (2011): A lithostratigraphical framework for onshore Quaternary and Neogene (Tertiary) superficial deposits of Great Britain and the Isle of

Man. *British Geological Survey Research Report*, No. RR/10/03.

MACDONALD, R. (1975): Petrochemistry of the Early Carboniferous (Dinantian) lavas of Scotland, *Scottish Journal of Geology*, 11, pp. 269-314.

MERRITT, J. W., COOPE, G. R., TAYLOR, B. J. and WALKER, M. J. C. (1990): Late Devonian organic deposits beneath till in the Teith Valley, Perthshire. *Scottish Journal of Geology*, 26, pp. 15-24.

MERRITT, J. W. and LAXTON, J. L. (1982): The sand and gravel resources of the country around Callander and Dunblane, Central Region, *Mineral Assessment Report of the Institute of Geological Sciences*, No. 121.

MONAGHAN, A. A. and PARRISH, R. R. (2006): Geochronology of Carboniferous-Permian magmatism in the Midland Valley of Scotland: implications for regional tectonomagmatic evolution and the numerical time scale, *Journal of the Geological Society*, 163, pp. 15-28.

MORETON, S. (1996): The Alva Silver Mine, Silver Glen, Alva, Scotland. *Mineralogical Record*, 27, pp. 405-14.

PATERSON, I. B. and HALL, I. H. S. (1986): Lithostratigraphy of the Late Devonian and Early Carboniferous rocks in the Midland Valley of Scotland, *Report of the British Geological Survey*, No. 18/3.

RAYMOND, A. C. and MURCHISON, D. G. (1991): The relationship between organic maturation, the widths of thermal aureoles and the thicknesses of sills in the Midland Valley of Scotland and Northern England, *Journal of the Geological Society*, 148, pp. 215-8.

READ, W. A. and JOHNSON, S. R. H. (1967): The sedimentology of sandstone formations within the Upper Old Red Sandstone and lowest Calciferous Sandstone Measures west of Stirling, Scotland, *Scottish Journal of Geology*, 3, pp. 242-67.

RIPPON, J., READ, W. A. and PARK, R. G. (1996): The Ochil Fault and the Kincardine basin: key structures in the tectonic evolution of the Midland Valley of Scotland, *Journal of the Geological Society*, 153, pp. 573-87.

RITCHIE, J. D., JOHNSON, H., BROWNE, M. A. E. and MONAGHAN, A. A. (2003): Late Devonian-Carboniferous tectonic evolution within the Firth of Forth, Midland Valley; as revealed from 2D seismic reflection data, *Scottish Journal of Geology*, 39, pp. 121 -34.

ROBERTSON, T. and HALDANE, D. (1937): *The economic geology of the Central Coalfield: Area I*, Memoir of the Geological Survey.

ROSE, P. T. S. and HARRIS, A. L. (2000): Evidence for the Lower Palaeozoic age of the Tay Nappe: the timing and nature of Grampian events in the Scottish Highland sector of the Laurentian Margin, *Journal of the Geological Society*, 157, pp. 381-91.

RUSHTON, A. W. A., BRÜCK, P. M., MOLYNEUX, S. G., WILLIAMS, M. and WOODCOCK, N. H. (2011): A Revised Correlation of Cambrian Rocks in the British Isles, *Geological Society of London Special Report*, No. 25.

SHACKLETON, R. M. (1957): Downward facing structures of the Highland Border, *Quarterly Journal of the Geological Society of London*, 113, pp. 361-92.

- SISSONS, J. B. and SMITH, D. E. (1965): Raised shorelines associated with the Perth readvance in the Forth Valley and their relation to glacial isostasy, *Transactions of the Royal Society of Edinburgh*, 66, pp. 143-68.
- STEPHENSON, D., BEVINS, R. E., MILLWARD, D., HIGHTON, A. J., PARSONS, I., STONE, P. and WADSWORTH, W. J. (1999): *Caledonian Igneous Rocks of Great Britain*, Geological Conservation Review Series, No. 17, (Peterborough: Joint Nature Conservation Committee).
- STEPHENSON, D., LOUGHLIN, S. C., MILLWARD, D., WATERS, C. N. and WILLIAMSON, I. T. (2003): *Carboniferous and Permian Igneous Rocks of Great Britain North of the Variscan Front*, Geological Conservation Review Series, No. 27 (Peterborough: Joint Nature Conservation Committee).
- STEPHENSON, D, MENDUM, J. R., FETTES, D. J. and LESLIE, A. G. (2013): The Dalradian rocks of Scotland: an introduction, *Proceedings of the Geologists' Association*, 124, pp. 3-82.
- TANNER, P. W. G. (1995): New evidence that the Lower Cambrian Leny Limestone at Callander, Perthshire, belongs to the Dalradian Supergroup, and a reassessment of the 'exotic' status of the Highland Border Complex, *Geological Magazine*, 132, pp. 473-83.
- TANNER, P. W. G. (2011): Discussion of The Highland Boundary Fault and the Highland Border Complex, BLUCK (2010), *Scottish Journal of Geology*, 46, pp. 113-24. *Scottish Journal of Geology*, 47, pp. 89-93.
- TANNER, P. W. G. and SUTHERLAND, S. (2007): The Highland Border Complex, Scotland: a paradox resolved, *Journal of the Geological Society of London*, 164, pp. 111-6.
- TANNER, P. W. G., THOMAS, C. W., HARRIS, A. L., GOULD, D., HARTE, B., TREAGUS, J. E. and STEPHENSON, D. (2013): The Dalradian rocks of the Highland Border region of Scotland. *Proceedings of the Geologists' Association*, 124, pp. 215-62.
- TREAGUS, J. E. (2009): *The Dalradian of Scotland*, Geologists' Association Guide, No. 67, (London: Geologists' Association).
- TREWIN, N. H. (ed.) (2002): *The Geology of Scotland* (4th ed.) (London: The Geological Society).
- UNDERHILL, J. R., MONAGHAN, A. L. and BROWNE, M. A. E. (2008): Controls on structural styles, basin development and petroleum prospectivity in the Midland Valley of Scotland, *Marine and Petroleum Geology*, 25, pp. 1000-22.
- UPTON, B. G. J. (2004): *Volcanoes and the Making of Scotland* (Edinburgh: Dunedin Academic Press).
- VINCENT, C. J., ROWLEY, W. J. and MONAGHAN, A. A. (2010): Thermal and burial history modelling in the Midlothian-Leven syncline in the Midland Valley of Scotland using BasinMod and HotPot, *Scottish Journal of Geology*, 46, pp. 125-42.
- WATERS, C. N, BROWNE, M. A. E, DEAN, T. and POWELL, J. H. (2007): Lithostratigraphical framework for Carboniferous successions of Great Britain (Onshore), *British Geological Survey Research Report*, No. RR/07/01.
- WATERS, C. N., SOMERVILLE I. D., JONES, S., CLEAL, C. J., COLLINSON, J. D., WATERS, R. A., BESLY, B. M., DEAN, M. T., STEPHENSON, M. H., DAVIES, J. R., FRESHNEY, E. C., JACKSON, D. I.,



MITCHELL, W. I. POWELL, J. H., BARCLAY, W. J., BROWNE, M. A. E., LEVERIDGE, B. E., LONG S. L. and MCLEAN, D. (2011): A Revised Correlation of Carboniferous Rocks in the British Isles, *Geological Society of London Special Report*, No. 26.

WILSON, R. B. (1989): A study of the Dinantian marine macrofossils of Central Scotland, *Transactions of the Royal Society of Edinburgh: Earth Sciences*, 80, pp. 91-126.

WOODCOCK, N. H. and STRACHAN, R. A. (eds) (2012): *Geological History of Britain and Ireland* (2nd ed.) (Chichester: Wiley-Blackwell).

WRIGHT, J. V. and WALKER, G. P. L. (1977): The ignimbrite source problem: significance of a co-ignimbrite lag-fall deposit, *Geology*, 5, pp. 729-32.

WRIGHT, V. P., TURNER, M. S., ANDREWS, J. E. and SPIRO, B. (1993): The morphology and significance of a super-mature calcrete from the Upper Old Red Sandstone of Scotland, *Journal of the Geological Society*, 151, pp. 871-83.

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