
Geology in south-west Scotland: An excursion guide

Editor: P. Stone with assistance from A.D. McAdam and J.I. Chisholm

British Geological Survey

In memory of Byron Charles Lintern 1948–1993

(Front cover)

(Rear cover)

(Frontispiece)

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Supported by the Edinburgh Geological Society

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Bibliographic reference: Stone, P (editor). 1996. *Geology in south-west Scotland: an excursion guide.* (Keyworth, Nottingham: British Geological Survey.)

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The British Geological Survey carries out the geological survey of Great Britain and Northern Ireland (the latter as an agency service for the government of Northern Ireland), and of the surrounding continental shelf, as well as its basic research projects. It also undertakes programmes of British technical aid in geology in developing countries as arranged by the Overseas Development Administration.

The British Geological Survey is a component body of the Natural Environment Research Council.

C20 1/96 ISBN 0 85272261 3

Printed in England by Linneys Colour Print Ltd

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2 Thornhill

3 Rockcliffe to Gutcher's Isle

4 Shawhead, Crocketford

5 Kirkcudbright

6 Afton Water, Hare Hill and Bail Hill

7 Loch Doon and Carsphairn

8 Girvan and Ballantrae

Excursions 9–14 each spend one day developing a particular geological theme in some detail.

9 Dumfries

10 Southernness to Borron Point

11 Dundrennan Ranges, Gipsy Point

12 Gatehouse of Fleet

13 Whithorn

14 Barrhill and Newton Stewart

Excursions 15–18 are planned to cover 2 or 3 days developing a geological theme in a regional context.

15 Rhins of Galloway

16 Creetown and Cairnsmore of Fleet

17 The Orlock Bridge Fault and Moniaive Shear Zone

18 Graptolite biostratigraphy

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Preface

This excursion guide, the first to detail the varied geology of south-west Scotland, is dedicated to the memory of Byron Charles Lintern who died, after a short illness, on 12 January 1993, aged 44 years. Byron was born in Willington, County Durham and graduated in geology from Bristol University in 1970. He began his career investigating base metal deposits in Botswana; the structural geology of these deposits was the theme of his PhD study completed at Leeds University in 1978. From Leeds, Byron moved to the British Geological Survey, working in Wallingford and Swindon before joining the Edinburgh Office in 1984. There he applied his considerable expertise in structural geology to the reassessment of regional models for Southern Scotland. His mapping contributions in this area include the Kirkcudbright (5W) and Dalbeattie (5E) 1:50 000 sheets published in 1993. His research interests were focused on the major shear zones of the region; it is particularly appropriate that this volume contains an itinerary for the Moniaive Shear Zone, recognised and defined by Byron shortly before his death.

This selection of geological excursions within south-west Scotland has been compiled by Byron's friends and colleagues as a tribute to his scientific achievements. It provides a fitting memorial to an outstanding field geologist and will hopefully pass on to others his enthusiasm for the rocks of Galloway. It contains an introduction to the geology of the region, and 18 excursion itineraries which between them describe examples of most geological features that can be appreciated in the field. The first eight excursions are of general interest and are intended for the non-specialist, whereas the last ten concentrate on specific themes and are of a more specialised nature. Mineralisation in the region is separately reviewed and a final section considers geological conservation with an appended list of Sites of Special Scientific Interest.

The British Geological Survey and the Edinburgh Geological Society are happy to join in producing this tribute to Byron.

Peter J Cook, DSc, CGeol, FGS *Director, British Geological Survey*

S Ian Hogarth, DRTC

President, Edinburgh Geological Society

7 April 1995

(Frontispiece). Geological column for the Mesozoic and Palaeozoic eras. IUGS time scale after Cowie and Bassett (1989).

Introduction

The main population centres are Dumfries and Stranraer. Local service buses link the main towns and villages, but independent transport will be required for most of the excursions described in this guide. Information on travel and accommodation may be obtained from the Dumfries and Galloway Tourist Board, Whitesands, Dumfries DG1 2SB (Tel. 01387 253862). The Gretna Gateway office (Tel: 01461 38500) is also open all year and from April to October the

following Tourist Board local offices are open: Castle Douglas (Tel: 01556 502611), Dalbeattie (Tel: 01556 610117), Gatehouse of Fleet (Tel: 01557 814212), Kirkcudbright (Tel: 01557 330494), Newton Stewart (Tel: 01671 402431) and Stranraer (Tel: 01776 702595).

Many of the routes recommended in the excursions cross private land. Users of this guide are reminded that access arrangements are their own responsibility, and local advice and entry permission should be sought where necessary. Some sites are designated as Sites of Special Scientific Interest (SSSIs), a comprehensive list of which is included in Appendix 2. Most of these are in private ownership and their designation does not confer automatic rights of entry; indeed, access to some may require advance written permission. The geological visitor should be particularly conscious of the need to conserve geological sites in general, and to keep the use of hammers to a minimum. There is usually loose debris around rock exposures and patient use of a hand lens is likely to be far more rewarding than vigorous but indiscriminate hammering. A comprehensive *Code of Practice* for geological fieldwork has been prepared by the Geologists' Association (copies available from the GA, c/o Burlington House, Piccadilly, London W1V 9AG) and all visitors to geologically important sites are urged to familiarise themselves with its contents.

The geological features described in the excursions can be studied with the minimum of equipment. A hand lens is essential and a compass-clinometer will be needed to check bedding and cleavage attitude in areas of complex structure. A geological hammer will be useful but should be used sparingly.

The excursions are arranged into three sections on the basis of their duration and geological specialisation. Excursions 1 to 8 will each provide a day of general geological interest and are particularly recommended for parties with a mixture of geological experience and/or background. Excursions 9 to 14, also each of one day's duration, focus on particular geological themes and develop them in some detail; a measure of specialist interest is needed if full advantage is to be taken of these. Excursions 15 to 18 are planned to cover two or three days each and develop specific geological themes in their regional context. These longer excursions are likely to appeal most to specialist groups. As a supplement to the excursions two appendices provide regional reviews of metalliferous mineralisation and geological conservation sites.

A word of warning: severe weather can develop over the Scottish hills at any time of the year. Always check weather forecasts and wear appropriate clothing and boots. For the coastal outcrops always check the local tidal conditions and be aware of the potential dangers both of the rising tide and of wave-swept rock areas. Particular safety warnings are indicated in bold type in the text.

Maps and general publications

National Grid references are used extensively for location throughout the guide. They fall into five 100 km-grid squares, NS, NT, NW, NX and NY. However, as most excursions lie within one 100 km-square the relevant letters are usually only given at the start of each excursion.

Ordnance Survey maps

Landranger maps at a scale of 1:50 000 are advised for route-finding for the excursions. The following cover the relevant part of South-west Scotland:

Sheet 71 Lanark and Upper Nithsdale area S

Sheet 72 Upper Clyde Valley

Sheet 76 Girvan and surrounding area

Sheet 77 Dalmellington to New Galloway

Sheet 78 Nithsdale and Annandale area

Sheet 79 Hawick and Eskdale area

Sheet 82 Stranraer, Glen Luce and surrounding area

Sheet 83 Newton Stewart and Kirkcudbright area

Sheet 84 Dumfries, Castle Douglas and surrounding area

Sheet 85 Carlisle and The Solway Firth

Bartholomew's 1:100 000 scale

Sheet 37 Galloway and Sheet 38 Solway Firth also cover the whole region.

Geological Survey maps

British Geological Survey maps at 1:50 000 or 1:63 360(*) scales are available for most of the region. Maps indicated \$ are reconstituted at 1:50 000 scale from earlier surveys. Maps indicated t are currently available as electrostatic plots, prior to publication. Published maps can be purchased from BGS at Murchison House, West Mains Road, Edinburgh, EH9 3LA, or from Ordnance Survey stockists.

Sheet 1 & 3	Rhins of Galloway Solid 1992
Sheet 1	Kirkmaiden Drift 1982*
Sheet 2	Whithorn Solid & Drift 1987
Sheet 3	Stranraer Drift 1982\$
Sheet 4W	Kirkcowan Solid 1992, Drift 1982\$
Sheet 4E	Wigtown Solid 1992, Drift 1981*
Sheet 5W	Kirkcudbright Solid, 1993, Drift 1980*
Sheet 5E	Dalbeattie Solid 1993, Drift 19801:
Sheet 6	Annan Drift 1983*
Sheet 7	Girvan Solid 1988, Drift 19811:
Sheet 8W	Carrick Solid 1978* , 19941, Drift 1981*
Sheet 8E	Loch Doon Solid 19771: , 19941, Drift 1980*
Sheet 9W	New Galloway Solid 1978\$, Drift 1979*
Sheet 9E	Thornhill Solid 1978* , Drift 1980*
Sheet 10W	Lochmaben Drift 19831:
Sheet 10E	Ecclefechan Drift 19821:
Sheet 11*	Langholm Solid 1968, Drift 1968
Sheet 14W	Ayr Solid 1978, Drift 1978
Sheet 14E	Cumnock Solid 1976, Drift 1980
Sheet 15W	New Cumnock Solid 1986*, Drift 1982\$
Sheet 15E	Leadhills Solid 1987*, Drift 19811:
Sheet 16W	Moffat Drift 1987*
Sheet 24W	Biggar Solid 1980*, Drift 1980*

There is also a 1:25 000 Sheet NX08, 18 and 19 (in part), Ballantrae, Solid, 1988. The 1:250 000 solid geological sheets give a synoptic coverage of south-west Scotland and the surrounding land and sea areas.

Borders Sheet 55N 04W 1986

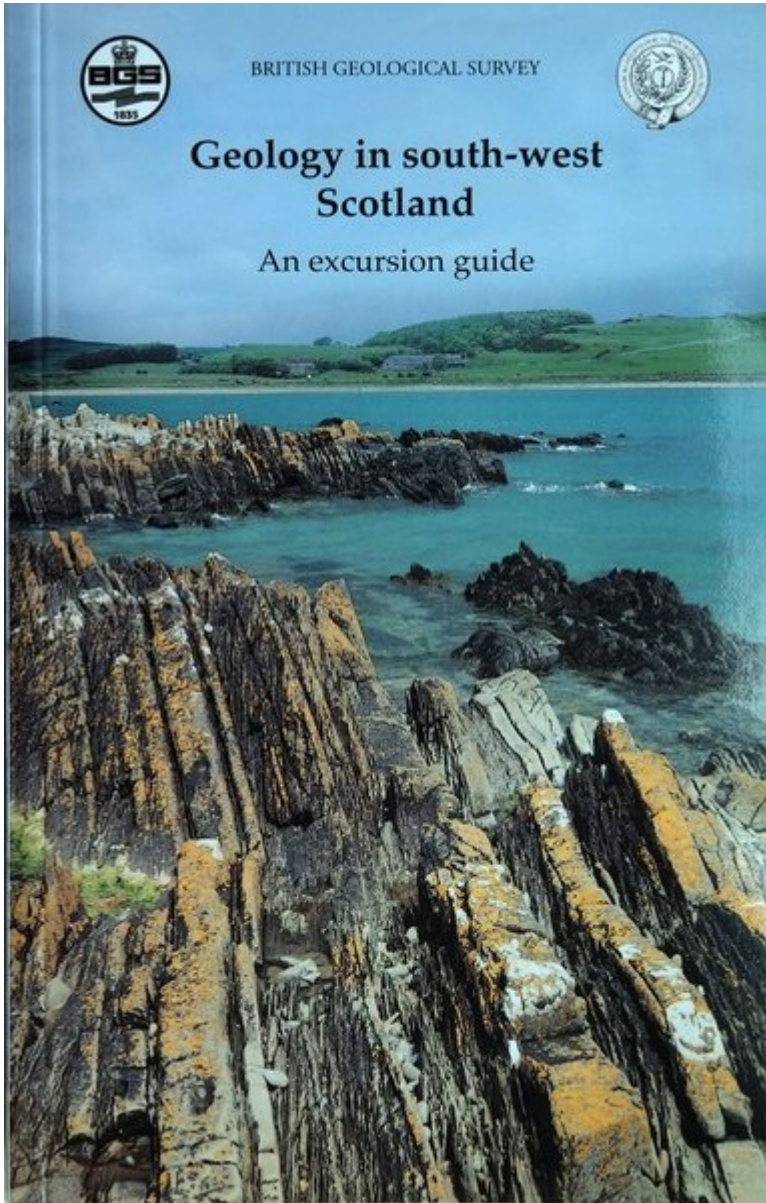
Clyde Sheet 55N 06W 1986 Lake District Sheet 54N 04W 1980 Isle of Man Sheet 54N 06W 1982

Geological maps at 1:10 560 or 1:10 000 scale are available for much of the region and may be consulted at the Library, British Geological Survey, Murchison House, Edinburgh, EH9 3LA. Dyaline copies can be purchased from the Sales Desk.

Publications

The geology of Scotland, 3rd edition, 1991, gives an introduction to Scottish geology. The third edition of the BGS regional geology, *The south of Scotland*, 1971, provides a more detailed, though somewhat dated, account. Sheet memoirs or explanations are available for Sheets 1 and 3 (The Rhins of Galloway) 1995, Sheet 2 (Whithorn) 1989, Sheet 7 (Girvan) 1986 and Sheet 11 (Langholm) 1967. Memoirs for several other sheets should be published shortly. *The Ballantrae area*, 1988, is described in the *Classical areas of British geology* series.

[References](#)



(Front cover)

Era	Approximate age (Ma)	System (Period)	Series (Epoch)	Orogenic episode	
MESOZOIC		CRETACEOUS		<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 20px;">HERCYNIAN</div> <div style="margin-bottom: 20px;">CALEDONIAN</div> <div>ACADIAN</div> </div>	
	135	JURASSIC			
	205	TRIASSIC			
	250	PERMIAN			
PALAEOZOIC	290	CARBONIFEROUS	Silesian		Stephanian Westphalian Namurian
			Dinantian		Viséan Tournaisian
	355	DEVONIAN			Upper (Late) Middle (Mid) Lower (Early)
	410	SILURIAN			Přídolí Ludlow Wenlock Llandovery
	438	ORDOVICIAN			Ashgill Caradoc Llandeilo Llanvirn Arenig Tremadoc
	510	CAMBRIAN			
	540				

(Frontispiece) Geological column for the Mesozoic and Palaeozoic eras. IUGS time scale after Cowie and Bassett (1989).