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# British Tertiary Volcanic Province

C. H. Emeleus, Reader in Geology, University of Durham and M. C. Gyopari, Senior Hydrogeologist, Groundwater Consulting Services

(with contributions from G. P. Black and I. Williamson)

GCR editors: W. A. Wimbledon and P. H. Banham

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## Contents

Acknowledgements

Access to the countryside Foreword

## **1 Introduction to the British Tertiary Volcanic Province**

The general setting

The igneous sequence

A review of research

## **2 The Isle of Skye**

Introduction

Fiurnean to Rubha na h-Airde Glaise

The Storr

Roineval

Talisker

Ros a' Mheallain

Allt Geodh a' Ghamhna

An Cleireach

Rubha Hunish

Marsco and Mheall a' Mhaoil

Coire Uaigneich

Beinn an Dubhaich

Kilchrist

Cuillin Hills

Rubha' an Eireannaich

## **3 The Small Isles — Rum, Eigg, Muck, Canna–Sanday**

Introduction

Fionchra

Allt nam Ba–Beinn nan Stac

Askival–Hallival

Harris Bay

Cnapan Breaca–Long Loch and Dibidil–Southern Mountains

South-west Eigg

Camas Mòr, Isle of Muck

East Canna and Sanday

#### **4 Ardnamurchan**

Introduction

Ben Hiant

Glas Eilean–Mingary Pier

Glas Bheinn–Glebe Hill

Beinn na Seilg–Beinn nan Ord

Ardnamurchan Point to Sanna

Centre 3, Ardnamurchan

#### **5 Isle of Mull**

Introduction

Bearraich

Ardtun

Loch Sguabain

Laggan Bay

'S Airde Beinn

Carsaig Bay

Loch Spelve–Auchnacraig

Cruach Choireadail

Allt Molach–Beinn Chaisgidle

Loch Bà–Ben More

#### **6 Isle of Arran**

Introduction

Ard Bheinn

Glen Catacol

Drumadoon–Tormore

Dippin Head

South coast of Arran

Corrygills Shore

## **7 Other Tertiary sites**

Introduction

Rockall

The Shiant Isles

St Kilda

Langbaugh Ridge and Cliff Ridge

## **References**

## **Glossary**

## **Index**

## **Acknowledgements**

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In 1987, Dr Emeleus and Dr M. C. Gyopari of the University of Durham were commissioned to write this volume for publication according to the format approved by the GCR Publications Management (now Advisory) Committee. Since that time, many others have contributed in various ways to the production of the volume; in particular, the editors wish to acknowledge the following: Professor Sir Malcolm Brown, FRS, who suggested several important improvements while refereeing the volume as a whole; Dr G. F. Marriner, Dr M. F. Thirlwall and Dr J. N. Walsh of Royal Holloway and Bedford New College, University of London, who commented helpfully on portions of the text; past and present members of the Publications Management and Advisory Committees for their support and advice; Dr D. O'Halloran, who has calmly managed this project on behalf of the Joint Nature Conservation Committee, and the GCR production team of Valerie Wyld (Sub-editor), Nicholas D. W. Davey (Scientific Officer) and Caroline Mee (Administrative Officer); the several Chief Wardens of the Rum NNR who over the years have greatly assisted Dr Emeleus in the field; Chapman & Hall for their help and advice at the final stages of publication; Lovell Johns Limited, Colwyn Bay, for cartographic drafting and David C. Davies for cartographic editing.

W. A. Wimbledon and P. H. Banham

## **Access to the countryside**

This volume is not intended for use as a field guide. The description or mention of any site should not be taken as an indication that access to a site is open or that a right of way exists. Most sites described are in private ownership, and their inclusion herein is solely for the purpose of justifying their conservation. Their description or appearance on a map in this work should in no way be construed as an invitation to visit. Prior consent for visits should always be obtained from the landowner and/or occupier.

Information on conservation matters, including site ownership, relating to Sites of Special Scientific Interest (SSSIs) or National Nature Reserves (NNRs) in particular counties or districts may be obtained from the relevant country conservation agency headquarters listed below:

Scottish Natural Heritage, 12 Hope Terrace, Edinburgh EH9 2AS.

Countryside Council for Wales, Plas Penrhos, Ffordd Penrhos, Bangor, Gwynedd LL57 2LQ.

English Nature, Northminster House, Peterborough PE1 1 UA.

## Foreword

When setting out to produce the Geological Conservation Review series the then Nature Conservancy Council rightly selected the British Tertiary Volcanic Province as one of its front-running topics. By any standards the Province is one of the outstanding features of British geology. It has contributed to the development of geological ideas, applied worldwide, over about 200 years, and holds a continuing position as a focus for international research. A prime earth science concern of any conservation agency must be to preserve the evidence on which scientific advances have been based, and to ensure that future generations have an opportunity to study the problems that remain. Of course, geological features are generally speaking pretty robust. Casual and thoughtless destruction on a grand scale, to which biological assemblages are so vulnerable, is not generally a serious problem. But geological knowledge depends on seeing the relationships between rock masses, the critical areas of outcrop may be few and far between, both in Highland Scotland with its peat moors and forests and in the agricultural lands to the south. It is documentation of these sites showing critical interrelationships that is the business of the Geological Conservation Review series. This volume provides the NCC's successor body, Scottish Natural Heritage, with the scientific justification to safeguard the described sites, which are the highlights of the Province.

Reading this volume brought home to me the scale of the scientific resource provided by the volcanic rocks and associated intrusions which make up the British Tertiary province. To a geologist many of the place names ring out like the names of great battles: Waterloo, Trafalgar – Skye, Mull, Rum, Ardnamurchan and lesser places have lent their names to rock types, used all over the world: benmoreite, allivalite, mugearite — to mention but a few. You can go to a scientific conference in California and hear American geologists talking about rocks named after tiny Hebridean hamlets, but also describing research, at the forefront of the international scene, which they are carrying out now on rocks from the Scottish Tertiary.

The province developed when the opening of the North Atlantic reached British latitudes about 65 million years ago. Truly vast outpourings of lava occurred, particularly in then-adjacent East Greenland, very probably associated with a 'hot spot' in the Earth's mantle which lives on to this day under Iceland. While the immense basalt fields of East Greenland are fearsomely inaccessible, the west of Scotland provides relatively easy access to the deeply eroded relics of the basalt pile and the frozen equivalents of the magma chambers (the central complexes) which lay beneath. Research on igneous rocks can take place at various scales, all admirably served by the Scottish Tertiary: in a regional setting, to understand problems such as the mechanisms and driving force behind ocean-opening, and the relationship between 'hot spots' and ocean formation; on the scale of a single volcano, to enable us to understand the processes of igneous intrusion, the evolution of magmas and the controls on episodic volcanic activity; and on the scale of the outcrop, where, for example, igneous layering, nowhere better shown than on Rum, still presents many totally enigmatic features.

Scotland's great natural laboratory is splendidly documented in this volume of the Geological Conservation Review. Henry Emeleus is an outstanding expert on the Tertiary igneous province, particularly with respect to the field relationships, at once the most fundamental and also the most difficult type of geological observation. He and his younger co-author, Mark Gyopari, have provided clear, crisp, beautifully illustrated accounts of sites, which will be of outstanding value to students, researchers, amateur geologists and professional conservationists. Because of its thematic character and style of presentation, placing local detail into a regional context, it provides an unmatched teaching resource. Finally, and most important of all, it sets out and values, for the first time, publicly and clearly, those sites which have contributed most in the past, and most probably will contribute in the future, to our enjoyment and understanding of one of the

grandest events in the geological growth of Britain.

Ian Parsons FRSE, Professor of Mineralogy, The University of Edinburgh

## [References](#)