# Precambrian rocks of England and Wales

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The cover shows the Malvern ridge, looking north-east across Broad Down. The eastern slope of the Precambrian ridge shown here is the topographical expression of a major Precambrian terrane boundary that was subsequently reactivated during the Caledonian, Acadian and end-Carboniferous (Variscan) orogenic events. Photograph by T.C. Pharaoh.

## Acknowledgements

Selection of the Precambrian sites described in this volume was initiated by the Nature Conservancy Council, following guidance from the then-Head of the GCR Unit, W.A. Wimbledon. At this time, sites were selected for two GCR 'Blocks' (selection categories) 'Precambrian of England and Wales' and 'Precambrian Palaeontology'. The selection work involved consultation with Precambrian specialists too numerous to mention here, but to whom grateful thanks are recorded.

In 1998, J.N. Carney of the British Geological Survey was commissioned by the JNCC (Joint Nature Conservation Committee) to compile this volume for publication according to the format approved by the GCR Publications Project Board. Since that time many others have contributed in various ways to the production of this volume; they are acknowledged on the title page either as co-authors or as major contributors to the geology of certain sections. Many sites have lacked an up-to-date account of the geology, and consequently the preparation of their descriptions involved field visits during which original observations were made. The writers therefore wish to acknowledge, in particular, the assistance afforded to them by private landowners or tenants, managers of recreation or conservation areas and the staff and management of the many quarries in which this work was carried out. Grateful thanks are also due to colleagues H.E. Boynton, E. Phillips and S. Howells for their helpful comments and discussion.

The diagrams were produced to a high professional standard by S. White and C. Pamplin of Xipress IT Solutions, Newmarket. The scientific content of most of this artwork is original, but where it has been replicated or modified from the work of others appropriate acknowledgements are given in the captions. Photographs are accredited in the captions, and the authors wish to thank all those people who provided photographs or gave permission to use illustrative material. Photographs from the British Geological Survey collection are reproduced by kind permission of the Director, BGS (© NERC, all rights reserved; IPR/6–8). The National Grid is used on diagrams with the permission of the Controller of Her Majesty's Stationery Office, Licence No. GD 27254X/01/00.

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## 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. 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 not 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:

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

English Nature, Northminster House, Peterborough PE1 1UA.

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

## Preface

The exposures of Precambrian rocks described in this volume provide rare glimpses of the geological 'basement' to the extensive Phanerozoic sedimentary successions of England and Wales. Since the mid-19th century these exposures have been the focus of scientific interest out of all proportion to their modest areal extent. Hence many of them are rightly regarded as classic sites of British geology, with place names such as Anglesey, Charnwood Forest, the Malvern Hills and Church Stretton known to generations of geologists, professionals and amateurs alike. A number of the sites are also of major international importance, including Anglesey, which incorporates the oldest documented examples of blueschist metamorphic rocks in the world, and Charnwood Forest where fossils representing the first British example of the Ediacara soft-bodied fauna were discovered. As a result of the field and laboratory-based detective work carried out in recent years by many researchers, a consensus has evolved that the various volcanic and sedimentary rock units described here developed during late Precambrian time along an active plate margin. This was characterized by volcanic arcs and marginal basins, and in a general sense was probably similar to the present day East Indies. Major zones of crustal weakness, such as the Menai Strait and Welsh Borderlands fault systems, may have been initiated in the late Precambrian, and some of these have been seismically active up to the present day. Despite this consensus view of the geology, there is still much more to learn, and for many of these rock units even the absolute and relative ages are not known with any great precision.

If research is to progress further on the late Precambrian rocks of England and Wales then it is imperative that these exposures, however small in size, are documented and preserved for future generations. Geology is an evolving science and existing models are subject to continual testing and modification as new data comes to light. The writers of this volume have made an important inventory of these geologically significant sites, and the mass of information that has been gathered is clearly explained and well illustrated. The accounts of these rocks will therefore be of considerable value to students, researchers and amateur geologists, and will also provide an unrivalled teaching resource. Even those who might have considered themselves as knowledgeable in this subject area will undoubtedly find much to learn here. Most importantly, the volume stands as an invaluable public record, and one that is also timely, given existing and likely future pressures on urban and rural land use. It justifies to the scientific and lay communities the reasons why these outstanding parts of our natural heritage require conservation, in order to ensure their accessibility for future generations of geologists.

Rob Strachan Spring 2000

**References**