BOOK REVIEWS

FARRANT, A. R. 2008. *A Walkers' Guide to the Geology and Landscape of western Mendip. Book and map at 1:25,000 scale*. 76 pp. + map in folder. Keyworth: British Geological Survey. Price £12.00 (paperback). ISBN 9780 85272 576 4.

FARRANT, A. R. 2008. *A Walkers' Guide to the Geology and Landscape of eastern Mendip. Book and map at 1:25,000 scale*. 68 pp. + map in folder. Keyworth: British Geological Survey. Price £12.00 (paperback). ISBN 9780 85272 575 7.
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The geology of the Mendip Hills of southwest England is familiar to many British geologists, although most will never have set foot in the area. Our knowledge comes from either the Wells 1:50,000 map or from the Bristol 1:50,000 special sheet, both classic maps for teaching and learning geological map interpretation in the UK. In the Mendips, the Devonian to Carboniferous succession was thrust and folded by the Variscan (late Carboniferous) shortening and then eroded at the arid Permian land surface. The delicately sculpted landscape of wadis and interfluves was then preserved beneath onlapping Triassic and Jurassic deposits, before being exhumed during Palaeogene and Neogene uplifts. The Quaternary river and estuarine deposits of the Somerset Levels to the south now enhance a strong scenic contrast with the more resistant uplands of the Mendips.

Why do relatively few geologists venture to visit this, on paper, classic terrain? Probably because, being south of the Quaternary ice limit, the degree of natural rock exposure in the Mendips is less than in glaciated areas further north. Students are taken, for instance, to the Yorkshire Dales to see Carboniferous rocks, or to the south Pembrokeshire coast to see their Variscan deformation. Publication of Andy Farrant's two map and guide sets to Mendip geology is an attempt to increase the popularity of this underused area.

The format of these guides is genuinely innovative, and conspicuously successful. Usually, geological itineraries in guidebooks are keyed to localities numbered on page-size line figures, only sometimes summarising the geology as well as topography. The localities in the Mendip guides are shown instead on two purpose-drawn full-colour 1:25,000 geological maps. This format allows each itinerary to be studied in its regional context. Crucially, contours, roads and other topographic components are clear enough to be used for navigation, and rights of way are emphasized in green. Gone then is the need to juggle all three media usually required for geological tourism: guidebook, geological map, and topographic map. Each main map mostly depicts bedrock geology, with only large areas of superficial deposits. Each map sheet also includes inset maps of local detail at 1:20,000, shaded relief and simplified bedrock geology maps at 1:100,000, four cross-sections, and a key.

Each booklet begins with sections on the rock types, the glacial history and the economic geology. Eleven or twelve local itineraries follow, each providing about half to one day's enjoyment. There is a geological glossary, some information on transport links and tourist offices, and good list of further reading and websites. Indeed, there is a 'Foundations of the Mendips' website, hosted by the British Geological Survey, which includes some of the book material and much useful information besides. The acknowledgements are notable for the wealth of acronyms. The project used funding from the SAMP, funded through DEFRA as part of the ALSF administered by MIRO for the DCLG. Whatever; the price has been held to a very reasonable £12 for each guide-plus-map package.

I have almost nothing but praise for these excellent publications. The booklets are written at a well-judged level accessible to the novice geologist yet rigorous enough to be useful to the professional. The illustrations are colourful and informative. The maps are a pleasure to use. My only quibble is with the unnecessary vertical exaggeration on the map and booklet cross-sections: Variscan structures are impressive enough and better understood without this 'enhancement'. However, this is no reason for potential visitors to the Mendips not to buy both these sets and to make better geological use of this important area.

Nigel Woodcock

SCHLÜTER, T. 2008. *Geological Atlas of Africa, with Notes on Stratigraphy, Tectonics, Economic Geology, Geohazards, Geosites and Geoscientific Education of Each Country*, 2nd ed. xi + 307 pp. + CD-ROM. Berlin, Heidelberg, New York: Springer-Verlag. Price Euros 169.95, SFr 282.50, US $249.00, £134.50 (hard covers). ISBN 9783 540 76324 6.
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Africa occupies nearly 20% of the Earth's land area and records at least 3.7 billion years of the Earth's history. It is one of the world-leading continents in terms of mineral reserves, well known among others for diamonds, gold, platinum-group metals, and titanium minerals. In recent years Africa has also attracted significant investment in the hydrocarbon sector. The first edition of the *Geological Atlas of Africa* appeared in 2006, aimed at summarizing the geology for each African country and territory, which of course is a huge effort.

The new edition follows the previous one and has been modified in parts; for example, new maps and many new photographs of geological sites have been added. The book is printed in full colour on high quality, glossy paper in A4 format. The book comprises 307 pages including 417 figures of which 67 are maps; eight are geological and political overview maps of Africa as a whole; the remaining 58 are geological overview maps, one for each country and territory. These maps are reproduced in PDF format on the accompanying CD-ROM.

The book is organized into four chapters. The first chapter (6 pages) outlines the aims and concept of the book. Chapter 2 (3 pages) gives an historical overview about geological mapping in Africa. The third chapter (15 pages) delivers a synopsis of the stratigraphy and tectonic development of Africa as a whole. Chapter 4, the main chapter (246 pages), examines each country of Africa in alphabetical order. Hence, this chapter comprises 58 sections, each between 2 and 8 pages in size. Apart from a geological overview map the accompanying text of each section summarizes the stratigraphy and tectonics, economic geology, geohazards and geosites, followed by a list of relevant references. Also useful are the alphabetical indexes at the end of the book

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with geographical names, geological terms and the names of cited authors. The quality of the second edition could have been improved by a thorough update of references. In total the book contains about 380 references. Of those nearly 60% are older than 1990, less than 20% are in the range from 2000 to 2008. The North African countries in particular have received much attention in the past decade, with many new data published that could strengthen the content of this book.

In summary the second edition of the *Geological Atlas of Africa* is a very polished piece of work and will be of benefit to anyone who needs a basic geological overview of African countries and territories. I would certainly recommend it as a library reference for attracting students in African geology. As emphasized by the author, the *Geological Atlas of Africa* provides a basic database to initiate new scientific research projects in Africa. This may help to promote African Earth sciences both within the continent and outside.

Guido Meinhold

ARNDT, N., LESHER, C. M. & BARNES, S. J. 2008. *Komatiite*. xiv + 467 pp. Cambridge, New York, Melbourne: Cambridge University Press. Price £75.00, US $150.00 (hard covers). ISBN 9780 521 87474 8.
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Komatiites are igneous rocks mainly of Archaean age. Their ultramafic origin is controversial and has been attributed to either high degrees of dry melting of peridotite in deep mantle plumes at temperatures up to 500 °C hotter than today, or to melting at shallow depth, in volatile-rich (hydrous) mantle with temperatures not much different than the 1200–1500 °C (for basalts and boninites) in contemporary mantle of subduction zones or below Archaean oceanic ridges. Komatiites often have exquisite disequilibrium mineral textures seldom seen in younger rocks. These spinifex textures give komatiite a mystical aura, keenly sought after, because a detailed understanding of their origin remains shrouded in the dissipated temperature and volatile gradients of komatiite magma. These unresolved issues thwart fundamental understanding of how the young, early Earth worked. *Komatiite* explores these issues in some depth. The principal author, Nick Arndt, has studied these rocks for nearly 40 years, from just after their discovery in South Africa, and has observed as many komatiites as anyone. His co-authors, together, have clocked up more than 50 years of experience on ore deposits associated with komatiites. Their book describes komatiites and their geological settings in considerable detail; all komatiites that have ever been found and described to date appear to be included. This well-illustrated book comprises two parts, both subdivided into seven chapters, and comes with an extensive bibliography of more than 700 references, a useful index, and four colour plates. Part I classifies and describes various aspects of komatiites: textures, field characteristics, mineralogy, geochemistry, isotope systematics and experimental data. Part II provides interpretations concerning the volcanology, origin, emplacement, economic value, tectonic setting and geodynamic evolution of komatiite magma.

Nick Arndt's previous (co-edited) book on these rocks, in 1982, was called *Komatiites*. A change to the singular in the title of this new book is symptomatic of present global petrologic group-think: Nick Arndt, his co-authors, and co-workers, are unapologetic followers of dry, white-hot, fluid komatiite lava derived from deep mantle plumes – one model fits all. But in reality komatiite has a very large range of composition (18–30% MgO, 44–52% SiO_2, etc). If they were modern rocks they would have five to ten different names. Clearly there are komatiites and komatiites, and it is perhaps unlikely that one idea (wet or dry) or tectonic setting will explain them all. That is like lumping basalts, boninites and andesites together and then asking whether they form wet or dry in one tectonic environment. Dry komatiites occur in some instances like, for example, the late Archaean Zimbabwe continental flood komatiites extruded subaqueously across and/or marginal to their craton as they do along present passive continental margins (e.g. Hynes, 2008). However, the observation that some minerals (pyroxenes) in the original type locality of komatiites (Barberton) can only be reproduced by hydrous experiments still stands. No-one has come up with a viable alternative explanation, despite attempts in this present book; one might as well take the arguments to the Moon where once one might have attempted to argue that such pyroxenes (augites) be used against wet komatiites, but now (since this book was written) new evidence suggests that even there the mantle of the early Moon might have been wet (Saal *et al.* 2008). Arndt argues that wet magmas would not retain their volatiles before reaching the surface. But there are modern, demonstrably hydrous, mafic magmas (boninites) that erupt as lava flows on the sea floor and preserve high water contents (upwards of 5%) without degassing or exploding. Barberton and other South African komatiites (e.g. Commondale) are similar to boninitic lava flows produced from wet magmas. Arndt thinks this is impossible, and to him proving that komatiites are lava flows equates to proving that they are anhydrous. Even if this were true, the field evidence that all komatiites are lava flows is equivocal, including in the type area of Barberton, despite Arndt's certification that recent mapping there has shown this beyond doubt, 'destroying the very foundations of the hydrous komatiite model'. There are plenty intrusive examples there; and in Australia and Zimbabawe too, where occasional cross-cutting relationships with host rocks have been interpreted as thermodynamic flow-erosion by some researchers and as intrusive contacts by others. The real issue here, which is not addressed at all in this book, is how these field relationships might be resolved to facilitate better reconstruction of the komatiite-magma plumbing systems that will help better understand the construction of Archaean lithosphere. There is a tendency also to apply inconsistent chemical criteria to these ubiquitously (and pervasively) altered rocks – as are all komatiites. For example, komatiites generally have 0.5–1 wt% TiO_2, whilst boninites have less than 0.5 % (by definition). There is some overlap, but they are distinct. Komatiites have slightly higher TiO_2 than boninites (except for Commondale that really looks like a boninite). Plots of various ratios with TiO_2 are used to argue that this 0.5 wt% difference proves that boninites and komatiites are completely different and that komatiites are plume magmas. Yet all assumed plume magmas have over 1 wt% TiO_2 and generally more than 2 wt% and there is no overlap with the komatiite data at all. The chemical traces left by Archaean processes need much more robust and careful detective work.

In the end, however, my real gripe with views expressed in the book lies in the often autocratic manner of self-fulfilling arguments. Interpretations are seldom as clearly separated from the observations and descriptions as the division into Parts I and II imply, and subjectivity is present throughout. Therefore, the book is an editorial contribution to the science of komatiites. That's OK – Arndt and his co-authors have put enough time in these rocks to deserve their say, but they cast aside the results of carefully conducted

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