
Despite an early interest in literature, especially humorous poetry, The Geology of the Island of Arran was Andrew Crombie Ramsay’s first geological work, originally produced as a guide for the 1840 British Association field expedition. Unfortunately, as a result of working late the previous night, Ramsay missed the boat and the expedition could not go ahead. However, his map and writings were published subsequently thanks to the encouragement of John Nichol from Glasgow University (to whom the book is dedicated), which most likely kick-started his rich geological career. His letters and writings span the United Kingdom, Europe and Asia (Geikie 1895), and his work culminated in becoming director of the Geological Survey in 1871, president of the British Association in 1880, and his knighthood in 1881 (Beckinsale 1975).

In a less literal sense, I missed the boat to Arran over a decade ago. As an undergraduate, my first-year trip was cancelled due to the outbreak of foot-and-mouth disease in 2001. I visited Arran for the first time this year, as a field trip leader, and finally completed my own geological education. This review marks both occasions: my first visit to Arran and the fascinating new digitally reproduced edition of Ramsay’s Arran.

Following a beautiful reproduction of his geological map of Arran, Ramsay’s own preface is refreshingly honest, stating:

The geological survey, as delineated on the map, is entirely the product of original and personal observation; and though it may probably exhibit some minor errors, it is confidently hoped that the disposition of the various formations, on the whole, will be found to be correct.

In Chapter 1, Ramsay describes how you can observe the large-scale features of Arran’s geology from the boat, very much as I did on the ferry from Ardrossan to Brodick. He then dives in, describing the ascent of Goatfell through Old Red Sandstone and slates, up into the Granite. He introduces the different varieties of Granite, and follows its boundary with the slates in Glen Rosa. I enjoy his minor digression to explain the erosive properties of water and the denudation of Glen Shirrag. As a premonition of his future work on glacial processes, for which he is probably best known, he states ‘The business of a geologist extends beyond a mere observation of the phenomena of rocks’ (p. 9).

Ramsay heads around the NE coast of the island in Chapter 2, describing the Carboniferous Series, discussing the fossils found in the Carboniferous limestones, and pointing to them as evidence for relative sea-level change. He finds the large ‘Producta’ brachiopods at Corrie, noting their preservation in life position as generations of students have since. He notes the alternation of coarse and fine sandstones in the Series, which, as we still interpret today, ‘ought to be attributed to the periodical increase and diminution of those currents or streams which bore the gravel to the ocean’ (p. 22). He continues into Glen Sannox, past the now-abandoned barite mines, and up to Hutton’s famous contact between the Granite and the underlying metamorphosed sediments.

In Chapters 3 and 4, Ramsay takes the reader westward around the north coast from Glen Sannox to Loch Ranza. He passes Fallen Rocks, still the bane of many geologists’ ankles, and remarks that, although it is not known how and when the fall occurred, ‘there is a tradition that the noise of the descent was heard in the Island of Bute’ (p. 29). From the unconformity between the sandstone and the underlying chlorite schist at Newton’s Point, now more famously known as Hutton’s Unconformity, Ramsay states ‘it is evident that a great and general disturbance, and dislocation of the hypogene strata had occurred, previous to the deposition of the secondary sandstones’ (pp. 35–36; note that the New Red Sandstone in his sketch is likely the Old Red Sandstone). We pause to admire the fossiliferous limestones of the Cock of Arran, and continue in order to enjoy the ‘solitary beauty’ of Loch Ranza (p. 36), which, unlike in Ramsay’s time, is now the location of the Arran whisky distillery.

In Chapter 5, Ramsay takes the reader south, past King’s Cave, once ‘residence of the patriot Bruce, and … the renowned Celtic hero, Fingal, whose image, with his mighty hunters and their dogs, may still be seen rudely sculptured on the walls’ (p. 52). Ramsay describes outcrops of ‘claystone porphyry’, now described as a Quartz-Feldspar-Porphyry. Continuing south, the touring geologist cannot but notice the large ‘basaltic promontory’ of Drummedoon Point (p. 53), or The Doon, now known to be a sill of the Quartz-Feldspar-Porphyry. The thorough survey of igneous intrusions continues around the south coast to Lamlash. Ramsay summarizes his observations in Chapter 6, including a lucid discussion of the cross-cutting relationships between different intrusions, and their relative ages, together with some extraordinary explanations for the phenomenon of quartz veining.

The ‘interminable war of words’ (p. 8) between the so-called ‘Neptunists’, who believed granite to be a primordial rock, and ‘Plutonists’, who saw, following Hutton, that igneous intrusions could be younger than sedimentary rocks, is a theme that flows throughout the book. Ten years after Hutton’s original description of the locality, Jameson, influenced strongly by the ‘Neptunist’ writings of Werner, revisited the contact between the Granite and underlying metamorphosed sediments in Glen Sannox, observing no indication of granitic intrusion (Nicholas & Pearson 2007).
Fifty years later, Ramsay observes, as Hutton did, ‘granite penetrating the slate in narrow veins’ (p. 25). Despite this discrepancy, Ramsay clearly had a high regard for Jameson’s meticulous field observations, and includes in Chapter 5 a reproduction of Jameson’s diagram of the Pitchstone veins, and lengthy excerpts of Jameson’s own writing. Rather than taking any obvious stance, Ramsay muses on lost time, and emphatically states:

Now that the bitterness of controversy has die away, it may well be a theme of wonder, on what ground the geologists of old could lose half a century in useless disputations regarding the comparative merits of their Volcanic and Plutonic creeds (p. 62).

Finally, Ramsay concludes with a list of essential equipment for any hardy geologist planning a trip to Arran, stating a flask will ‘in nine times out of ten, be considered by at least one of the party as a most desirable accompaniment’ (p. 73). Some things, apparently, really don’t change.

References


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How to Read the Landscape: A crash course in interpreting the great outdoors is certainly no academic field guide but this should not deter lay-geomorphologists and geologists. The foreword clearly explains the purpose of the book: to allow people to understand their physical surroundings when on holiday, for instance. Having a consultant editor with a solid academic background and current working position in earth sciences, more specifically, physical geography, the reader should feel confident that the information delivered is both accurate and reliable. Robert Yarham is a professional natural science writer, often published in The Guardian, making this book accessible to the geology-geomorphology enthusiast.

Colour photographs and pencil drawings adorn nearly every page and text is kept to short, sharp statements. The photographs are beautiful and depict stunning examples of geomorphological and geological phenomena and, in some ways, are too good. The reality is that in the Highlands of Scotland one is more likely to chance upon a poor, vegetated example of patterned ground rather than the spectacular examples illustrated from Iceland.

We are introduced to the book by some vague and airy statements about human beings wanting to connect to the natural landscape in a primeval way. Academics may find this type of ‘spiritual connectivity’ statement, though pleasant in sentiment, somewhat irritating and completely unnecessary. However, for some, this may be the type of introduction that inspires them to read on.

Following the introduction, the book pursues a logical structure. Part one: Understanding the Landscape introduces how rocks form and then discusses the deformation and destruction of rocks through tectonics, weathering and erosion, with illustrations of the plethora of landforms associated with these processes. Fossils are also included in the processes section, which at first seems odd but makes sense when one realizes that it is the process of fossilization that is being discussed.

Part two: Reading the Landscape forms the bulk of the book and provides the reader with a selection of landforms that are categorized into Uplands, Lowlands, Coast, Karst, Other Landscapes and Artificial Landscapes. The author does try to emphasize that these categories are not exclusive. Of note, ‘Other Landscapes’ describes the climatic control on landscape structures and forms and how the current landscape may contain relict features from previous, different climatic regimes. These are rather complex concepts to grasp, particularly for what is essentially a field guide, but the authors have done well in portraying the long- and short-term dynamics of the Earth at different scales.

The ability to read and interpret different types of maps and locate oneself in the hills is vital in the Earth Sciences. It is, therefore, very encouraging to have this covered in the final section of the book, Mapping the Landscape. The brief introduction to the history of mapping is informative and sets up the chapter well, more so than the preceding chapters. This final section is also a ‘quick start’ guide to navigation in the hills and demonstrates that the author has been responsible in recognizing the need to educate the reader in the tools necessary to operate safely in the outdoor environment.

The generic topographical and geological maps in this final section are illustrative but lack contour heights and grid lines. Given that this is a guide to geomorphological features, it would have been more informative if examples of these features on topographical maps were also used alongside the photographs. Directing the reader to online resources for geological maps is a welcome initiative to persuade the reader to seek more material themselves. Unfortunately, topographical maps aside, as an introduction to reading a geological map, many useful interpretative details are omitted. Symbols on the geological maps, representing folding, intrusive features and lithological unit abbreviations, are not referred to at all; a simple comprehensive legend would have solved this issue.
Despite the text being short, snappy and generally informative, the reader occasionally chances upon a certain phrase that has a literal scientific meaning but has been misconstrued: ‘...so much of the landscape has been altered by humans since we evolved into farmers’ (p. 41). I await with eagerness the paper that formally describes this new species of *Homo farmer*. Additionally, there are also some simple errors in location names, for example, ‘Mount Snowdon’ rather than the correct ‘Snowdon’.

Careless ambiguities, probably a result of keeping the book accessible, further compound the lack of accuracy. Some of the titles for landforms can be misleading. For example, ‘River Islands’ is used to headline how braided rivers form. This is inaccurate if applied to all islands found in rivers.

A glossary can be a most effective tool, allowing the author to explain a complicated term only once thus freeing up text space for more information. Like a dictionary, many people may consider the glossary definition to be absolute, thus the need for careful and appropriate choice of words is paramount during its construction. Unfortunately, some of the definitions given are, again, ambiguous, inaccurate or wrong. For instance, lineation simply is not ‘an arrangement of any features found in a rock’.

The index has been constructed so as to try and anticipate what the target audience may look for when they observe a structure or feature. ‘Steps in rock’ directs the reader to a section on waterfalls and upland river rapids, but I wonder if people will be misled into thinking that some anthropogenic steps carved into rock are the product of waterfalls or upland rapids.

*How to Read the Landscape* is a collection of titbits of information on the subjects of geology, geomorphology and geography. With bold pencil drawings and impressive photographs, this would be a suitable revision tool for secondary school students. However, this guide appears to be targeted at those who want to recognize and understand the rich variety of features found in landscapes, at home and abroad, without formal study. To this end, it serves its purpose and the errors encountered are likely to be missed by many through ignorance alone without any great damage to their understanding. However, I think that in a publication attempting to explain complex ideas in a simple and clear way there should certainly be a stronger emphasis on accuracy without casual errors slipping through the editorial net.

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Ronald Turnbull may already be known to you as the author of the Cicerone Guide on lightweight trips to the hills, *The Book of the Bivvy*, and as a contributor to various outdoor magazines. That is where I have encountered his writing before and enjoyed much of it, so I was intrigued to see he had produced a book on geology aimed at the mountain sports community. The book was initially published in hardback in 2009 but the lighter-weight A4-sized paperback might fit in to a larger rucksack to be left at base or bivvy rather than confined to the coffee table.

The organization of the book is somewhat similar to the other book aimed at outdoor enthusiasts, *How to Read the Landscape*, in that it divides the subject matter into chapters based on different rock types, after explaining some elementary geological processes and the geological time-scale in the first chapter. Oddly most of the minor typos and mistakes that I could detect lay in this first chapter, e.g. Iapetus rather than Iapetos, while the rest of the text is free of obvious mistakes unless one is being particularly pedantic about terminology. Pedantry rarely wins converts to one’s cause, so I am happy enough for the Paleogene Volcanic Province to be labelled Tertiary, although any future revision could correct such minor terminological issues.

Much of the remainder of the book does focus firmly on the British Isles, with very occasional excursions to foreign massifs and, as such, will appeal to the outdoor community as much of the text is tied very specifically to particular mountain ranges. For instance, the chapter on greywacke focuses nearly exclusively on the Rhinnogs, a group of infamous mountains in Wales. Many of those who know their Scottish rocks will protest about the greywackes of the Southern Uplands. Turnbull lives in SW Scotland and knows about them well but talking about the Southern Uplands would spoil the anecdotes about hill running and getting lost, soaked and scarred in the Rhinnogs. The author is very much present in the text, which I think is apt in a book like this but not everyone may enjoy this aspect of the work. However, the anecdotes make it clear that Turnbull understands that a book like this should perhaps entertain first, while informing, as this is the way to interest people in a subject.

Occasionally the format breaks down, partly due to rocks not sorting themselves into convenient non-overlapping geographical areas. For instance, the chapter ‘All-Terrain Lakeland’ starts with the Skiddaw Slates, veers in to a discussion of granite and then moves in to a discussion of volcanic rocks. However, Turnbull uses this as an opportunity to explain how the different rock types give rise to the differences in slipperiness and ease of climbing. A sense of intimate acquaintance with the rock pervades the book, something that is often missing in books on geology and landscape. As such, it sometimes feels like a climbing or hill walking guide, for instance a caption on p. 94 describes the ashfall tuffs of the Napes Buttress as being ‘a much friendlier-feeling rock’. Turnbull also makes the case for the incredible geodiversity of the mountains of the British Isles by pointing out that the different ranges are made up of seventeen different major rock types, compared to the 3–4 of most other well-known walking and climbing areas, even if you suspect he might be downplaying the other areas a bit.

The book is profusely illustrated, with a great number of the superb photographs being taken by the author, which is quite unusual these days where the photographs are either from archives or taken by a separate photographer. The photographs tend towards panoramic and scenic shots.
or images of climbers and walkers in action. However, a number also show the broader cultural use of stone in buildings or monuments. Several excellent shots of plants highlight the intimate links between geodiversity and biodiversity. Throughout the book there is a keen awareness that mountaineers are not the only people in the mountain landscape. The colour diagrams and maps are often very simplified but achieve their aim in most cases.

While the review might have given the impression that Turnbull is skipping over the activities of geologists in favour of rock athletes, this is not the case. He comes across as keenly aware of the descriptive and observational aspects of geology. He notes that quartz arenites are mislabelled as quartzites in a display in the Natural History Museum in London. At several points in the book he also complains that many geological field guides for the British Isles do not cover much ground that is not by a car park or roadside verge, which is the sort of accusation usually levelled at North American field guides. He invokes the spirit of Hutton to get us to venture deep into the mountains and hills to examine exposures. As such, the book does indicate that there is a hunger for more accuracy and more understanding of what hill walkers would like to know and the interest in going to less visited outcrops that are historical and of academic interest. However, there was a dearth of well-illustrated maps and helpful page references. The incorporation of the etymology of certain words, such as ‘volcanic’ relating to the Roman god of fire, vulcan, give an added dimension of interest. However, there was a dearth of well-illustrated colour pictures within this section; a schematic sketch of the moon’s volcanic history would have been appropriate.

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As a third-year Earth Science undergraduate, I certainly found Introducing Volcanology to be a ‘detailed but accessible introduction to volcanoes and their plumbing system’. Aimed at both the inquisitive amateur and the ‘more advanced reader’, presumably undergraduates, Introducing Volcanology aims to satisfy a wide readership. From the onset though, there is an unfortunate omission of the geological division of time, surely a must for any geology text, especially one attempting to establish the framework of igneous geology. Detailed colour pictures, such as the rocks from the field (e.g. p. 47, Skye) excellently highlight the type of igneous textures that can be found, even by an amateur.

The ‘Types and scales of eruption’ section (Ch. 4) was indicative of the author’s ability to communicate to the amateur and undergraduate alike. The easy to read, rhetorical question-based introduction engages the reader by identifying the common questions, such as ‘how big do eruptions get?’, that are at the heart of geological inquisitiveness. The concise coloured figures capture the eye and are typical of the nature of figures found in undergraduate earth science texts – the types of volcanoes figure (p. 31) is, in fact, adapted from the USGS and, therefore, information of repute. There is, however, only tantalizing reference to igneous geochemistry, such as the fact that more viscous magma is associated with more explosive eruptions; the fact that this viscosity is related to the evolution of the magma chamber and, moreover, distinct processes, such as subduction, should surely be explored in more detail, especially for the understanding of the more advanced undergraduate reader.

The lack of geochemical discussion is also prominent in the ‘Volcanoes, life and climate’ section (Ch. 8), where the link between large igneous provinces (LIPs), or flood basalts, and mass extinctions is explored (p. 76). Sadly, the author merely alludes to the fact that LIPs coincide with the major mass extinctions of the Phanerozoic, with a brief description of how they may have been related to significant climate change and ocean anoxic events. LIPs’ relation to mass extinctions, though, is one of the most fascinating, and widely contested, topics within earth science. The so-called iridium ‘spike’ at points in Earth’s history, such as at the Cretaceous–Paleogene and Permo-Triassic boundaries, is at the heart of the debate; some authors argue that the spike is related to extraterrestrial impact events – the catastrophists – whereas scholars such as Vincent Courtillot argue that iridium spikes can be related to mantle volcanism. Nevertheless, there is no reference to the iridium spike, or to any further reading that could explain the concept in greater depth and, as such, the text is devalued as it fails to truly capture the essence of one the most critical and intriguing igneous geology concepts. Meanwhile, the documentation of volcanic activity throughout the wider solar system was fascinating, volcanism on Jupiter’s moon Io being of particular interest. However, there was a dearth of well-illustrated colour pictures within this section; a schematic sketch of the moon’s volcanic history would have been appropriate.

An excellent index is presented, with concise definitions and helpful page references. The incorporation of the etymology of certain words, such as ‘volcanic’ relating to the Roman god of fire, Vulcan, give an added dimension of interest, outwith the typical scientific field. The individual chapters were too often isolated, without a distinct link to the next chapter. For instance, Chapter 7 is concerned with igneous intrusions, together with the sub-volcanic plumbing system, which hardly flows logically into Chapter 8, which describes the impacts of volcanoes on climate and life. The chapter on pyroclastic eruptions (Ch. 6) could have provided an excellent segue into the ‘Volcanoes and Man’ chapter, the Vesuvius eruption an obvious example that links the two sections. On a related note, the author neglects to highlight the significance of studying pyroclastic deposits, something that would surely add to both the reader’s interest and understanding. In examining pyroclastic deposits, such as ash fall deposits, the frequency of events can be established; ultimately, detailed forecasts can be made regarding the nature of future eruptions, and how they may disrupt society, such as the case of the
recent Icelandic volcanoes. The role of volcanoes as a factor in the present climate change debate is another significant omission. An anthropogenic global warming sceptic may argue volcanoes have a more significant contribution to CO₂ emissions than anthropogenic factors; the USGS, meanwhile, states that anthropogenic CO₂ release is 10 000 times greater than volcanic emissions annually. Nevertheless, volcanic activity is a prominent topic within the climate change debate; the failure to communicate this message somewhat undermines the book’s ability to generate a comprehensive understanding of the concept of volcanology.

The very size of the textbook merits particular description: neither a traditional A4 or A3 size, nor small enough to be pocket sized. The aforementioned colour field pictures are detailed and could be used as an excellent tool to identify igneous textures in the field; the book, however, is slightly too large to fit in a pocket. Furthermore, the paperback nature of the book would lead to it being tarnished when carried about, especially if the reader were indeed to take it into the field. A more robust, hardback – smaller in size – would allow intrepid readers to take to the field with their *Introducing Volcanology* at hand. Otherwise, the text could be in danger of becoming lost amongst larger textbooks within one’s book collection. Concepts are explained clearly, and concisely, in such a manner that the material proves to be accessible for an amateur enthusiast, though critically without simplifying and, therefore, diluting the key messages. Due to limitations in scope, the book is unlikely to really satisfy the interests of the more advanced reader. The lack of reference to important topics, such as the debate concerning volcanology and climate change, in addition to no further reading list being presented, ultimately means the text would add little to the existing understanding of Honours-level students and professionals.

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