



Rocks and Rock Formations: A Key to Identification (Princeton Field Guides).

Jürg Meyer (translated by Mark Epstein). Princeton University Press, 41 William Street, Princeton, New Jersey 08540, USA. 2021. 192 pages. Price: US\$ 19.95/£16.99.

Rocks abound in nature and their diversity can excite amateurs as well as professional enthusiasts alike. However, their precise identification in the field, at times, can be a daunting task even to the experienced geologists who resort to thin sections under the microscope to ultimately deduce their identity. The author of this field guide, Jürg Meyer – a professional geologist from Switzerland, who is also a licensed mountain guide, and lecturer – penned this work to allow beginners with little previous experience or knowledge of rocks to successfully distinguish them in the field itself using a key which has been proposed based on collective criteria such as careful observations, magnifying hand lens, pen knife and some patience.

The book begins with a brief section on the challenges involved in the identification of rocks when compared to the practices followed in distinguishing plant and animal species from one another. It has been rightly pointed out that geology as a subject is either taught very little or not taught at all in schools – this is one of the reasons for the lacunae. The long (millions of years) geological history, spatial variability, secondary alterations (resulting from groundwater percolation and weathering) and inherent nomenclature chaos (where many rocks can have different names based on the region where they are found) are the other well-known factors listed by the author.

The first formal section of the book introduces the fundamentals involved in the

study of rocks – crystals, minerals, classification of rocks into igneous, sedimentary and metamorphic groups, and the complexity of solid solution within the minerals. In order to identify and interpret the rocks, the foremost key is to identify and distinguish as many minerals as possible. An overview of the most important rock-forming minerals – silicates and non-silicates (such as oxides, sulphides, oxides, hydroxides, carbonates, etc.) has been provided, which gives information about their chemistry, important diagnostic characteristics and distribution. The rock textures and structures from an outcrop to hand specimen scale also play an important role in rock identification. A table containing the most important concepts related to them are summarized, aided by colour illustrations, and these include stratification, bedding, jointing, dykes, nodules, ripple marks, pillow structures, flow structures, aureoles, degree of crystallinity, textural features of individual grains in igneous, sedimentary and metamorphic rocks, besides many others. Factors favouring fossilization and secondary alterations in rocks such as chloritization, saussuritization, oxidation, etc. are also introduced to the reader. Observation, description and identification of a rock indeed is an art and involves much practice. The methodology involved in obtaining a good representative hand specimen, correct use of magnifying lens and the utility of Moh's hardness tester for mineral identification are discussed along with a proforma for describing the collected hand specimens from the field.

The second part of the book is devoted to the identification key developed for individual hand specimens backed up with illustrations. The developed key is claimed to have the potential for an unknown rock type to get assigned to the correct rock family. The author makes a candid confession that other important information, such as geological context of the outcrop and output from laboratory techniques are needed to arrive at an unambiguous identification in some cases. However, identification of some exotic rocks characteristic of old continental shields such as kimberlite, komatiite, carbonatite, charnockite, etc. is stated to be beyond the scope of the key. Likewise, the influence of Alpine geology and rock types is implicit in the key, obviously owing to the expertise of the author in this domain, even though in principle the key may be universally applicable. Pre-requisites for the successful

implementation of the key, such as recognition and distinction between important rock-forming, minerals, reaction to HCl, concepts related to structure and texture, etc. are emphasized. The key divides the rocks into three broad categories: (i) solid rocks (cohesive and firm), (ii) vein fillings and (iii) unconsolidated (non-cohesive) rocks. Taking into consideration the macrocrystalline, microcrystalline, composite nature of the rocks, as well as their textures, mineralogy, etc. many illustrations of varied igneous, sedimentary and metamorphic rocks and some of the ores as well are provided for a ready comparison for the identification of unknown samples.

The final chapter provides a brief summary of the classification of igneous, sedimentary and metamorphic rocks prescribed by the International Union of Geological Systematics (IUGS), which is followed by all professional geologists and taught at academic institutions.

This book runs into 195 pages and contains nearly 530 photographs/diagrams covering many examples of igneous, sedimentary and metamorphic rocks one can normally expect to encounter in the field. The photographs (around 2 × 2 cm or 5 × 5 cm) presented are macroshots of the rock surfaces and the scale has been avoided intentionally by the author for the sake of legibility. A few figures are exceptionally good, but many of them are either too small or of poor quality, e.g. lack contrast and perhaps defy the purpose of the book. Moreover, without a scale, visualizing the grain size – which effectively distinguishes between various rock types – may not be so straightforward, especially for amateurs. After going through the book one gets a gut feeling that the heterogeneities of the rocks are so vast, owing to the complexity of the minerals, textures and processes underlying their formation, that only their first-order identification may be made in the field by a non-specialist deploying the key proposed. Notwithstanding this, the enthusiasm and honest effort by the author need to be appreciated for bringing out this field guide which should interest all those involved in the multifaceted aspects of rocks.

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