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BOOK REVIEW

Introduction to Metamorphic Textures and Microstructures (2nd edition). By Andrew J. Barker. Stanley Thornes (Publishers) Ltd. Distributed by International Specialized Book Services, Inc., 5804 N.E. Hassalo St., Portland, Oregon 97213-3644, U.S.A., xiii + 263 pages, US$49.95 (paper), ISBN 0-7487-3985-8.

The volume here under review is an expanded version of the original edition published under the same title in 1990. Being unfamiliar with Prof. Barker's first edition, this reviewer cannot compare the two. *Introduction to Metamorphic Textures and Microstructures* is "...primarily written for the advanced undergraduate ... [and as] a useful source of reference for any geologist dealing with metamorphic rocks" (page v). The text is divided into three parts: Introduction to metamorphism and metamorphic rocks (38 pages); Introduction to metamorphic textures and microstructures (74 pages); Interrelationships between deformation and metamorphism (108 pages). The first part is background for the book's aim: To explore the recovery of the memory of metamorphic processes locked into the textures of recrystallized rocks. Eight types of metamorphism are reviewed briefly. Four are regionally extensive: "organic" (= dynamothermal or just plain regional of old), ocean-floor, subduction-zone (= high-P facies series), burial. The four others are localized: contact, hydrothermal, shear-zone, shock. Although this part offers a rather complete (but abbreviated!) run-through of metamorphic petrology, touching on environments and processes, the facies concept, petrogenetic grids, and the compositional groups of metamorphic rocks, it is hopelessly insufficient to serve as a text alone. Probably it would be useful as a refresher for a professional long out of school.

The second part opens by failing to resolve the long-standing confusion in this reviewer's mind between the terms "structure" and "texture". Barker writes: "Microstructure should be used to cover all aspects of the microscopic arrangements and interrelationships between grains, while restricting the term texture to those arrangements in which there is some preferred orientation" (p. 39). That aside, this part of the book is composed of four chapters that cover: A) Classification and development of planar features (cleavage, schistosity, banding, and layering). B) Nucleation, growth, morphology, twinning, and zoning of individual grains. C) Inclusions, exsolution, symplectites (including myrmekite), and coronas. D) Retrograde metamorphism. Here, this reviewer was pleased to see stated an unpopular view that he has held for 35 years, namely "...that fluids, having been driven off by the various devolatilization reactions associated with prograde metamorphism, re-enter rocks during uplift, to induce retrogression" (p. 101). However, referring to hydrous diaphthoritic rims on anhydrous prograde phases (*i.e.*, chlorite shells on garnet, p. 103) as coronas seems inappropriate.

The last part of *Introduction to Metamorphic Textures and Microstructures* deals with the intertwining of deformation and metamorphism. It is made up of five chapters that deal with: A) Mechanisms of cataclastic and ductile deformation. B) Porphyroblast–foliation relationships. This is an especially risky subject, a real "panier de crabes". In fact, referring to asymmetric porphyroblasts, Barker writes: "... that despite much research over many decades, there remains considerable debate and controversy concerning the interpretation of even the simplest types ..." (p. 161). C) Shear-sense indicators. Here uncertainty bristles. D) Veins and fluid inclusions. The discussion on fluid inclusions is hopelessly oversimplified. E) Polymetamorphism and polydeformation. The reader is here introduced to P–T–t paths, with dire warnings against oversimplifications.

The central text of the book is followed by three appendices: A) A two-page list of abbreviations. B) A glossary of some 225 terms. C) Key mineral assemblages for a dozen metamorphic facies given by chemical class. A detailed 9-page index concludes the book. Well, almost (see below).

While reading *Introduction to Metamorphic Textures and Microstructures*, this reviewer found himself asking: Is this a textbook or a cookbook? In other words, would it serve an undergraduate course, or could it be a source to find interpretations of classic microstructures (or, heavens, textures!)? Probably neither. The strength of the book is to provide an overview of the subject bolstered by a great wealth of references to recent journal articles. It would be particularly useful to the practising geologist who for the first time is faced with the interpretation of deformed rocks in thin section. In short, although up to date, Barker's book lacks the rigor of Spry's *Metamorphic Textures* (1969) or Vernon's *Metamorphic Processes* (1975), both unfortunately now obsolete.

The text is clearly written, though in places repetitive, and almost free of typos. Word breaks, however, are careless, leading to "porphyrob- last nucleation"

(p. 143) and others of the same ilk. Figures and captions don't fare too well. Some examples: Stt for St (Fig. 7.6) and, good Lord!, Mineralogical Society of Canada for our treasured MAC (Fig. 10.5). Fig. 8.7 has an inadequate caption, and the scale bar in Fig. 11.1a certainly is not 1 mm. Many abbreviations used in a cavalier fashion in the text are not explained in the appendix (*i.e.*, ITD, IBC, CPO, S, C, C', Si, Se, and others). Some terms touched on in the text aren't in the glossary. It is H.L. (not A.L.) Alling (p. 99). On the other hand, the black-and-white photos are of better than average quality, and the 44 color photomicrographs (on eight pages) mostly are superb. Fruitlessly, I looked for their captions, eventually finding them glued to the two sides of the endpaper, apparently a publisher's oversight. Finally, the free use of the honored (but, alas, banished) names sphene and crossite is refreshing.

In conclusion, *Introduction to Metamorphic Textures and Microstructures* is a useful overview of a complex and controversial subject, supported by abundant up-to-date references. If there is to be a third edition, it would do well to omit the first part and the third appendix, and expand substantially the second and third parts.

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