Book Reviews

MIGMATITES J. R. Ashworth (Editor), Publisher: Blackie & Son Limited, Bishopbriggs, Glasgow G64 2NZ (1985), pp. 302. Price: £ 27/50.

This book comprises petrological review articles of selected researchers working in the migmatite field. These articles do not cover every aspect of the subject, since the book is not intended to supersede, but rather to complement the standard text book of Mehnert (1968). The extended essays presented here, are to some extent, stimulated by the publication of the excellent collection of research papers by Atherton and Gribble (*1983*). Some of the problems encountered there are reviewed in more detail in this book. Unlike other books, this book concentrates wholly on migmatites, and deals about partial melting and its consequences. This emphasis reflects the current balance of opinion that most migmatites originate through partial melting. Each chapter represents the personal view point(s) of the author(s). The need for further research is a recurring theme.

The volume includes 8 chapters, the first five chapters and the 8th chapter deal with specific methods of approaching the study of migmatites, whereas chapters 6 and 7 deal with migmatites of particular geographical regions in which there has been much recent research.

The book starts with an introductory chapter by the editor in which a review of the definition of migmatites, processes of migmatization, relationship of migmatites and granites, textures and structures of migmatites as possible indicators of melt presence, estimation of P-T-a_{H_2O} of migmatite formation and its relationship to granulite facies has been attempted. The editor also has highlighted the points of interest presented in other chapters and expressed some of his own opinions on these aspects.

Chapter 2 by W. Johannes will be read with particular interest by current workers in the field of migmatites, as it summarizes in a succinct manner the results of experimental studies which have been used to explain the formation of migmatites and their significance. Suggestions have also been made for further experimental and petrographic investigations.

Chapter 3 by James A. Grant covers some of the aspects of phase equilibria in partial melting of compositions that are pelitic in a broad sense. Discussions are confined mainly to relatively simple systems, namely, K_2O-FeO and MgO-Al_2O_3-SiO_2-H_2O with or without CO_2. The author has started with the consideration of possible equilibria in the absence of liquid and proceeded to melting with P_{H_2O} equal to P_{total}, then with P_{H_2O} less than P_{total} and finally vapour absent conditions.

The 4th chapter by Sakiko N. Olsen deals with mass balance in migmatites. Mass balance, according to the author, is a quantitative tool in determining the mechanism of migmatization. He enumerates the methods and assumptions of mass balance calculations. The results of these mass balance calculations are also discussed. This chapter is useful from the point of view of providing an insight into the complexities of migmatization processes.

Chapter 5 by J. R. Ashworth and E. L. McLellan describes the textural properties of migmatites. The authors emphasize that textures, used sensibly, in conjuction with other petrological and field data, can help to elucidate the origin of those

migmatites with little subsequent metamorphic history, and post migmatization history of others. The study of grain size, grain shape and grain orientation, according to the authors, help in distinguishing anatectic and non-anatectic migmatites and deducing the timing of migmatization.

Chapter 6 by Robert J. Tracy describes the distribution, characteristics, tectonic evolution and origin of migmatites in the northern Appalachians in New England. The review makes it clear that many important questions like: whether there are any particular tectono-metamorphic regimes that better lend themselves to the production of migmatites at higher metamorphic grade and the roles of purely conductive *vs.* magmatic heat transport in the production of migmatites and the mechanism of heat transport, still remain unsolved.

David Barr (Chapter 7) classifies the migmatites of the Moine area into early migmatites and late migmatites. The early migmatites are invariably deformed and primary structures are rarely preserved; the late migmatites are only weakly deformed and often retain primary structures. According to the author these migmatites represent different episodes of migmatization which occurred broadly at the same time and can plausibly be related.

The 8th chapter which is authored by J. Touret and Sakiko N. Olsen deals with fluid inclusions in migmatites. The studies have demonstrated that despite the complex nature of fluid inclusions in migmatites, there are some systematic and coherent patterns in the occurrence of these inclusions, viz., chemically different fluids are limited to H_2O, CO_2, CH_4, N_2 and their mixtures. The oldest seem to be pure CO_2 inclusions and the youngest H_2O. The oldest CO_2 inclusions are much more abundant in the leucosome, indicating a relationship between the formation of these inclusions and migmatization processes. In the discussion, the authors state that in spite of detailed study many unresolved problems remain and two important ones among them are the source of fluids, especially CO_2 and N_2 and the reason why these fluids which should be miscible are often closely associated and remain separated. In the final analysis the authors point out that internal buffering of fO_2 by the oxides, which constitute one of the aspects of fluid inclusion problems, has not been investigated. Any future study, according to the authors, should combine microthermometric methods with careful petrographic studies. This chapter is well written and will stimulate investigators interested in the study of fluid inclusions in general and migmatites in particular.

The editor at the end has thoughtfully provided both subject and author index.

This book will serve as a good guide for future researches on migmatites. It is undoubtedly one of the best publications on migmatites and should appeal to a wide range of researchers and students. The book is reasonably priced and within the means of most libraries in the country.

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