

BOOK REVIEWS

Mackenzie, W. S., Donaldson, C. H., and Guildford, C. *Atlas of Igneous Rocks and their Textures*. Longman Group Ltd., 1982. vii + 148 pp., 293 colour photographs, 12 figs., 2 tables. Price £9.95.

In the production of this book, the authors have displayed not only their belief in the scientific value, but also a measure of simple delight in the beauty and variety of the textures of igneous rocks when viewed in thin section with the polarizing microscope. They have done this through the medium of coloured photomicrographs, following the pattern in the companion volume *Atlas of Rock-forming Minerals in Thin Section* (M.M. 43-1075). The photographs are of good quality and generously displayed on glossy pages of large size (approximately 22 × 28 cm). The result is an attractive book which will appeal not only to formal students in earth sciences (and, I suspect, to many teachers), but also to the growing numbers of those who are interested in collecting and studying rocks and minerals at home or as an extra-mural and possibly museum-linked activity. Amongst this readership there will be some with the necessary enthusiasm and dexterity to make their own thin sections following the methods described in a two-page appendix. It is good to be reminded that thin sections, which are so critical in any scientific study of rocks, can be produced, given time, and skill, with simple equipment and at low cost.

Part I (pp. 1-74) deals with textures, and Part II (pp. 75-141) illustrates the features shown by sixty-three selected examples of igneous rock types. Illustration of most of the textures and each of the major rock types is by matched pairs of photomicrographs of a selected field, the first with plane polarized light (PPL) and the second between crossed polars (XPL).

The wealth of illustration is effective and necessary for the book to be as valuable as it undoubtedly is in extending the range of experience of igneous rocks and their textures beyond the limitations set for most users by availability of collections, laboratory time, and expert tuition. Even having the combination of PPL and XPL photographs, and with fields of view large enough to be representative for most rocks, there still remain significant gaps in the information that can be read from 'static' illustrations which experienced teachers will recognize: is this black area seen in the XPL photograph volcanic glass, an isotropic grain, an anisotropic one in extinction, or a hole in the rock-slice? In addition, there are a few kinds of rock—commendably few with the quality of illustration

provided—that defy adequate representation by the means chosen. It is no reflection on the quality of production to say that some illustrations of coarse-grained quartz-feldspathic or feldspathoidal rocks appear very uninformative with both PPL and XPL, and the same is true of some of the poorly crystalline to glassy volcanic rocks, particularly when, as is commonly the case, they have been affected by devitrification or alteration, giving a fuzziness that could only be resolved in practice under the microscope. These would be serious criticisms if the authors claimed this to be an instructional textbook of petrography. They very consciously do not do this and indicate clearly that learning the subject requires dedicated practical work with the microscope, preferably with guidance from an experienced teacher. Adequate grounding in the principles and practice of mineral identification is a necessary preliminary.

Only this, accompanied by reference to relevant texts, will give a student the confidence, manipulative skill and three-dimensional feel for the subject which microscopic petrography needs if it is to be of scientific value as well as general interest.

The authors have used traditional and descriptive terminology as far as possible, and avoided rock names and textural terms that offer particular genetic implications. This seems wise on several counts. First, as stressed by the authors, readers will hopefully be less constrained by prejudice in interpreting evidence from the photographs. Secondly, the rate of advance of theoretical knowledge and laboratory techniques relating to the behaviour of melts, glasses and crystallizing phases is too rapid at present for dogmatic interpretation and thirdly, geological factors which are often critical in the interpretation of textures are not considered in a book such as this Atlas.

I view the Atlas as a welcome companion to the literature, and one that will stimulate interest in the practical development and application of microscopic petrography.

M. K. WELLS

Williams, H., Turner, F. J., and Gilbert, C. M. *Petrography: an Introduction to the Study of Rocks in Thin Sections* (Second Edition). San Francisco and Oxford (W. H. Freeman), 1982. xiv + 626 pp., 162 figs. Price £20.95.

This book is best reviewed by comparison with the First Edition published in 1954 as a relatively slim volume of about 400 pages. It has been widely

appreciated by petrologists through its provision of a comprehensive and balanced introduction to the characteristics of igneous, sedimentary, and metamorphic rocks as seen in thin section. The extensive series of drawings of thin sections by the late Howell Williams which formed a major feature of the First Edition (and were, in fact, the only illustrations) have been retained in the Second Edition. Happily, additional contributions from his pen have been included in the present work: the most notable is a full page illustration of petrographic variation shown by eight basalts and andesites from the Paricutin volcanic suite. About half of the rocks described and illustrated are from the United States.

Although the descriptive petrography remains little changed, substantial changes and additions (amounting to approximately 200 pages) have been made to the more petrogenetic material. This reflects the spectacular advances made in all branches of the science in the past 30 years. It also reflects the research interests of the authors working in a geologically stimulating environment, and has been designed to be consistent with their other published works.

A theme of thermodynamics has been woven unobtrusively into relevant parts of the text, and thermodynamic principles are outlined in a 20-page Appendix, using data on albite for illustration. Other major additions include: an opening chapter on the nature and crystallization of magmas, illustrated by phase diagrams; discussion of the influence of geological setting in time and place on petrographic variation; updating of the account of sedimentary rocks, especially in regard to their classification and to discussion of sedimentary processes; while the metamorphic section is enriched with information—much of it in diagram form—on chemical reactions, mineral assemblages, and facies.

There is an interesting discussion on classification and nomenclature of igneous rocks with cogent arguments in defence of schemes such as the authors use, based on modal mineral composition as pioneered by Rosenbusch and now 'time-honoured and seasoned by a century's use'. At the same time they question some of the basic assumptions regarding the universal applicability of the IUGS proposals based on the rigidly symmetrical divisions of the proportions of Q–A–P–F components as shown in Fig. 2.13 which reproduces the now familiar diagram for the plutonic rocks.

With all the additional material listed above, this Second Edition of 'petrography' has acquired many attributes of a course book of petrology. Many will doubtless welcome this; but the book's success in its rather new and certainly enlarged role will depend

upon individual budgets and the programmes of learning and training that are followed.

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Arndt, N. T., and Nisbet, E. G. (editors). *Komatiites*. London, Boston, and Sydney (George Allen & Unwin), 1982. xvii + 526 pp., 227 figs. Price £40.00

Komatiites are highly magnesian ultramafic lavas whose unique character was recognized as recently as 1969, when they were first described in detail from the Komati river valley in southern Africa. Petrographers were of course familiar with picritic lavas which are olivine-rich, but unlike picrites which crystallize from a basaltic magma carrying suspended olivine crystals the komatiites are the products of a genuinely ultramafic liquid. The key to their recognition was the presence of spinifex-texture, a dendritic growth of olivine and pyroxene crystals caused by the quenching of Mg-rich liquid.

This volume is a collection of twenty-nine papers on all aspects of komatiites, including their occurrence, their textural and field characteristics, their geochemistry, and their economic significance. Most of the descriptions of komatiites are from Archaean greenstone belts, because this is where komatiites are normally found. Naturally many of these very ancient rocks have been altered, metamorphosed or deformed, but the characteristic chemistry and spinifex texture has enabled them to be identified. Several papers describe possible occurrences of komatiitic rocks of post-Archaean age, usually as part of an ophiolitic assemblage, and these are mostly described as komatiitic basalts, being less magnesian than the Archaean examples. The geochemical studies of komatiites reported here include work on major and trace element compositions and on Sr, Nd, and O isotopes. Several of the geochemical authors refer to the evidence for mantle source heterogeneity shown by these lavas. Because they must represent such a high degree of melting in their mantle source regions, the komatiites may prove to be very informative about the nature of the early Precambrian mantle, and particularly about its content of chalcophile and siderophile elements. This is of more than academic interest because economically significant nickel sulphide deposits are associated with a number of komatiite occurrences in different parts of the world.

This volume as a whole is beautifully produced and well illustrated. Many of the papers contain information which has already been published in journals, but it will be valuable for specialists in this