

inclusions occurring in kimberlite are presented for dunite, pyrope-lherzolite, pyropewebsterite, eclogites, and also for coexisting minerals from these rock types. Other inclusions, notably the mica-pyroxenites, glimmerites, together with phlogopite plus ilmenite, mica-apatite rocks, and picritic porphyries are also detailed. The chemical characteristics of kimberlites and eruptive breccias of porphyritic alkaline-ultrabasic rocks naturally follows the petrographic section.

Minerals occurring both in kimberlite and its numerous inclusions are discussed in a separate section and here details of their morphology, including intricately sculptured surface phenomena, optical properties, and chemical compositions are featured. Picroilmenites have been singled out for extensive study and apart from numerous chemical analyses thermoelectromotive force and magnetic susceptibility data are presented.

Recent phase equilibrium studies, in conjunction with petrographic observations, have been applied to kimberlite minerals endeavouring to ascertain *PT* conditions of formation. Consequently a number of subfacies are delineated, e.g. diamond, pyrope, perovskite subfacies, etc., and all are individually described.

The final two sections deal with the evolution of alkaline-ultrabasic magma during kimberlite formation and the position of kimberlites in the classification of igneous rocks.

Although the presentation closely simulates a typed text the numerous diagrams and photographs for this type of book are very clear. The translation is a very welcome contribution to kimberlite petrology by bringing information on Russian kimberlites to light, although the use of the term rhombic pyroxene and the lack of an index when a multitude of facts is presented are regrettable.

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KENT (P. E.), SATTERTHWAIT (G. E.), and SPENCER (A. M.), editors. *Time and Place in Orogeny*. Geological Society of London, Spec. Publ. No. 3. viii + 311 pp., 106 figs., 7 pls., 1969. Price £7.50.

This volume is intended to form the introduction to a series dealing with the compilation and interpretation of factual data about the Tertiary and Mesozoic orogenic belts, as part of the 'Data for orogenic studies' project. Reviewers are notoriously hard men, carping where they neither sow nor reap, but this book can be received with enthusiastic praise despite its handicap of being a collection of papers originally presented at a symposium.

A detailed list of the fifteen papers has been listed in *Mineralogical Abstracts* (M.A. 70-2953) and need not be repeated.

Shackleton opens with some customary succinct and stimulating remarks. Falcon follows by describing the structural units of the Zagros Range, south-west Iran. He shows that even where a wealth of borehole information is available, prediction of the nature of deep structures is usually highly unreliable. As Rast points out, despite the immense volume of detailed work available on the geology of the British Isles, we still do not know what the structure of the Pre-Cambrian basement is. A fundamental

difficulty that emerges from many of the papers, including Fox's description of a part of the Rocky Mountains, is the extent to which the basement in orogenic belts is involved in lateral shortening. How do we extrapolate from stratal shortening to obtain crustal shortening or is the surface evidence really irrelevant? According to Fox the basement under the Rockies is not involved in the thrust structures he describes. Many Soviet geologists believe orogeny to be essentially the result of vertical movements in the basement with no significant lateral shortening. In a most important paper Ramsay outlines possible methods for measuring fairly precisely the strain and displacement across an orogenic belt. Oxburgh, in an erudite examination of the geophysical deductions about the deep structure of orogenic belts, points out that the pattern of shear-wave velocities under orogenic belts is different from that under cratons down to at least 200 km, implying that the crust and the upper mantle are involved. Tarling selects a number of instances of displacements within continents as deduced from palaeomagnetic evidence. Harland endeavours to tidy the geosemantic weeds that impede the correlation of orogenic events by stratigraphic methods but like most weeding it is necessary but not very exciting. The meaning of isotopic ages in orogenic belts, including the problem of slow cooling versus rapid cooling of metamorphic terranes, is dealt with by Brown and Miller and again in a paper by Fitch, Miller, and Mitchell on the relatively new ^{40}Ar - ^{39}Ar dating method, which promises to enable overprinted ages to be characterized. Stoneley's most valuable summary of the thicknesses of sediments in a number of orogenic belts emphasizes a point apparent in several of the papers, namely that it is doubtful if there is one orogenic belt that is typical of all orogenic belts. There are shorter papers by Bott, Sutton, Clifford, Phillips, and Byrne.

This book summarizes much of what we know about orogenesis and shows how little we comprehend about the time span and deep shape of orogenic belts, their mechanism of formation and the reasons for their locations. The need to assemble the factual data about even one orogenic belt is apparent.

B. E. LEAKE

BARTH (T. F. W.), CORRENS (C. W.), and ESKOLA (P.). *Die Entstehung der Gesteine—Ein Lehrbuch der Petrogenese*. Berlin, Heidelberg, and New York (Springer-Verlag), 1970 (Reprint of 1939 ed.). viii+422 pp., 210 figs. Price DM96 (\$26.40).

This is a well-printed reissue of a very successful textbook first published in 1939. Though the reprint will be welcomed, it is to be regretted that opportunity was not taken to bring the volume abreast of the advances, especially in the experimental field of the subject, recorded in the last twenty years.

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