

BOOK REVIEWS

DEER (W. A.), HOWIE (R. A.), and ZUSSMAN (J.). *Rock Forming Minerals*. London (Longmans), 1962. Vol. 1: *Ortho- and Ring Silicates*. x+333 pp., 88 figs., 53 tables. Vol. 3: *Sheet Silicates*. x+270 pp., 58 figs., 44 tables. Price £4. 15s. each volume.

In 1914, V. M. Goldschmidt presented a memorable address on the status of mineralogical science, since translated into English by G. Kullerud (1961). There he pointed out that the responsibility of mineralogy is not limited to investigations and descriptions of individual minerals, but that 'Crystallography, experimental physics, analytical and synthetic chemistry, thermodynamics, and geology must be counted as the absolutely necessary background for mineralogical investigations . . .'. Few could then have foreseen the great advances to be made by the science in this direction, since that time, or would have predicted that nearly 50 years would elapse before an attempt was made to draw together information thus obtained into a single book. Deer, Howie, and Zussman, in performing this formidable task, have succeeded in producing an admirable work which will doubtless earn them the gratitude of those for whom it is primarily designed, i.e. advanced students and research workers in the geological sciences, as well as workers in other sciences.

The two volumes now available form part of a work consisting of five volumes, dealing with the common minerals of igneous, metamorphic, and sedimentary rocks. The complete work includes over 420 figures and diagrams, 260 tables, 1620 analyses, and 6650 references. The three volumes yet to appear will deal with the Chain Silicates, Framework Silicates, and Non-Silicates, and will each be the same price as the others. For the purpose of review, the description of volumes 1 and 3 can be taken as indicative of the form of presentation and scope of the succeeding volumes.

Volume 1 deals with the olivine and humite groups, zircon, sphene, the garnet group, idocrase, sillimanite, andalusite, kyanite, topaz, staurolite, chloritoid, datolite, sapphirine, the epidote group, lawsonite, pumpellyite, the melilite group, beryl, cordierite, tourmaline, and axinite. Volume 3 deals with the mica group, stilpnomelane, pyrophyllite, talc, chlorite, septechlorite, serpentine, the clay minerals, apophyllite, and prehnite. The authors have restricted the coverage to the more important minerals, their criterion for selection, as stated in the preface, being

generally that the presence or absence of these minerals serves to determine or modify the name of a rock. Though some might disagree with this reason for selection, the outcome can hardly be faulted, for it is difficult to find a significant mineral omission amongst even the less common varieties considered under the main types listed above.

The olivines may be taken as an example of the treatment of a mineral group, for the pattern of description is adopted for most of the other minerals. Five sub-sections are preceded by a tabular summary of the optical and other physical properties, implemented (for the biaxial minerals) by excellent three-dimensional sketches showing the principal crystallographic and optic directions of a typical member of the group. The structural subsection includes an atomic structure diagram, X-ray determinative curves, and a table of cell parameters. The chemical subsection consists of 21 analyses together with structural formulae, 6 important thermal equilibrium diagrams involving the olivines, and discussions on trace element distribution, heats of solution in HF, Mg/Fe⁺⁺ distribution between co-existing olivines and orthopyroxenes, high pressure polymorphs of fayalite, synthetic Ni- and Ge-olivines, and alteration products (with 3 analyses). A section on optical and physical properties, as well as presenting full-page determinative curves, includes a concise presentation of some of the mathematical relationships between physical properties. The small subsection on distinguishing features is of minor significance, and could have been omitted. In the final subsection, on paragenesis, the authors give a brief account of the distribution of olivines in different rock types and its significance, and discuss serpentinization and corona structures. The olivine section covers 33 pages, and ends with 108 references, but apart from these commoner varieties there are separate sections devoted to tephroite and knebelite and to monticellite.

The garnet group occupies 36 pages, with 56 analyses and 168 references, and the mica group 102 pages with 93 analyses and 300 references, while for even the less important minerals such as zircon, described in 10 pages, 6 analyses and 58 references are given.

The presentation of data on each mineral group under the five subsection headings results in a well-balanced and relatively exhaustive coverage. The paragenesis subsection is, naturally, the most open to criticism, but the authors have refrained from presenting a biased account of the hypotheses on mineral genesis and at the same time have enlivened each mineral section by giving a well-reasoned account of this subject. On the other hand, the reviewer feels that, to take the

olivine section as an example, there is room for slight improvement. It is a pity that, in discussing olivine distribution, mention has not been made of olivine settling in Bowen's crucible, lava flows, and the Palisades sill, of the evidence for the contrasted stability fields of olivines in tholeiitic-type (e.g. Palisades) and alkali-type (e.g. Shiant) basalt magmas, and of the significant disappearance and reappearance of olivine in the Skaergaard intrusion (in relation to the synthetic system $MgO-FeO-SiO_2$). The statement, on p. 26, that fayalite in granites is usually restricted to pegmatitic segregations, is unlikely to meet with general approval, and it is surprising that reference is not made to local British examples such as fayalite-bearing Skye granophyres and the Arran pitchstones. In such a large, neatly subdivided work as this, the authors have been faced with the difficult problem of where to place certain facts, and in certain cases paragenetic aspects appear in the chemistry section and vice versa; this could hardly be avoided. A more acute drawback lies in the placing of mineral groups that have close genetic relationships into separate volumes, such as the olivines and pyroxenes. The omission of the important system $Fe-Di-SiO_2$ from the olivine section is a case in point, and it is to be expected that part of the olivine story may be continued in volume 2.

The work involved in producing such a monumental work must have been somewhat exhausting, and the authors are to be congratulated on maintaining a high standard of writing throughout each volume, and for diligently assembling recent information up to the time of going to press. In such a rapidly developing subject it is apparent that the issue of further, revised editions will involve them in more than the average amount of fresh writing. Already, extensive new accounts of minerals such as chloritoid have appeared, and it is questionable whether any mineralogist would have the courage to close a chapter on the feldspars without some misgivings. For many years, however, these five volumes should serve their purpose well, as an indispensable aid to the research worker in petrology, and of the authors it can be truly said that they have lived up to the high expectations of those who have looked forward to the appearance of this book.

G. M. BROWN

COMPTON (R. R.). *Manual of Field Geology*. New York and London: John Wiley and Sons, Inc., 1962. x+378 pp., illus. Price 57s.

PROFESSOR COMPTON wrote this *Manual of Field Geology* primarily 'to assist undergraduate students in field training', but in the preface he also indicates that he has included specialized procedures and data