unaltered druse material free from appreciable magnetite: SiO_2 51·32 [etc. as in my no. 47].

The last is the analysis I quoted as no. 47, Biella, Piedmont, Zambonini. The difference between Leake no. 18 and my figures is due not to miscalculation but to my rejection of the early Cossa analysis in favour of that by Zambonini (1905). If, in spite of Zambonini's criticism, the 'Leake 18' analysis is to be used, it should be attributed to Cossa, not Zambonini.

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Aluminium paper laps for polished sections.

ALUMINIUM laps (Min. Mag., vol. 32, p. 738) continue to give very useful results. It has been found, however, that some aluminium foils commonly sold carry an invisible coat of plastic varnish. This renders the foil useless since it prevents the diamond particles from becoming imbedded in the metal surface. Care should be taken to obtain an unvarnished foil; this should give a vigorous cutting action on a sulphide mount within two minutes. The 'silver paper' I used was supplied by F. and G. Kettle, 127 High Holborn, W.C. 1.

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BOOK REVIEWS

DEER (W. A.), HOWIE (R. A.), and ZUSSMAN (J.). *Rock-forming minerals.* London (Longmans), 1962 (vol. 5) and 1963 (vol. 2). Vol. 2: *Chain silicates.* ix+379 pp., 89 figs., 58 tables. Vol. 5: *Non-silicates.* ix+371 pp., 59 figs, 54 tables. Price £4. 15*s.* each volume.

This work consists of five volumes, and a previous review of volumes 1 and 3 included an appraisal of the scope, style, and standard of the series as a whole (this vol., p. 434). Volume 4, on the framework silicates, is expected to appear later this year.

Volume 2 deals with the pyroxene group, wollastonite, pectolite, rhodonite, bustamite, pyroxmangite, and the amphibole group. The sections on the important pyroxene and amphibole groups, almost equal in length, account for all but 36 pages of this volume, the data

being far in excess of those presented for any other mineral group in the preceding volumes. The description of the pyroxene group, as an example, includes separate sub-sections on orthopyroxenes, diopside–hedenbergite, johannsenite, aegirine–aegirine-augite, spodumene, jadeite, augite, pigeonite, omphacite, and fassaite.

The comments on the olivine group, in the previous review, are relevant generally to the other large mineral groups. However, a group such as the pyroxenes requires special mention because of the sheer magnitude of the assembled information, including 202 chemical analyses. The intelligent way in which the data are handled impresses upon the reader the fact that this book is far more than a compendium of mineral properties. For example, the clinopyroxenes in the system $CaMgSi_2O_6$–$CaFeSi_2O_6$–$Mg_2Si_2O_6$–$Fe_2Si_2O_6$ are treated as separate sub-groups according to their calcium contents, while within each sub-group the members are described in an order from magnesian through to ferriferous varieties. Such logical presentation, combined with plenty of diagrams and critical discussion, means that the reader is taught mineralogical and petrogenetic principles much more than in the purely factual type of mineralogy textbook. However, some of the pitfalls encountered in the pigeon-holing of members of isomorphous mineral groups have not been avoided. For information on the closely related suite of pyroxenes from a single intrusion (the Skaergaard), the reader needs to begin with, and then return to, the diopside–hedenbergite sub-section, after referring to the orthopyroxene, augite, and pigeonite sub-sections. Only after much practice, and the compilation of a cross-reference system, can one locate with ease the appropriate diagrams correlating the sub-groups according to particular inter-relationships. It is partly for this reason that the reviewer finds no merit in the authors' choice of a sequence in which descriptions of johannsenite, aegirine, spodumene, and jadeite fall between those of either orthopyroxene and pigeonite, or diopside–hedenbergite and augite.

Volume 5 deals with the oxides, hydroxides, sulphides, sulphates, carbonates, phosphates, and halides. This choice of a chemical rather than a structural classification represents a departure from the scheme adopted for the silicates, but results in a convenient grouping of genetically related minerals, such as the carbonates. On the other hand, a group such as the oxides includes such a diverse assemblage that a general introduction has not been attempted. This large group includes periclase, cassiterite, corundum, hematite, ilmenite, rutile,

anatase, brookite, perovskite, and the spinel group: the spinel group is subdivided into the spinel, magnetite, and chromite series. The sub-section on the spinel group represents an anomaly in the classification system for this volume, in that structural criteria are employed. Although scientifically commendable, the printer's type used for the sub-headings in the text differs from that in the Contents List, and some difficulty is experienced in coming to grips with the layout of the spinel sub-section. The placing of the non-silicates in pigeon-holes is as vulnerable to criticism as for the silicates, and in the case of ilmenite and magnetite the duplication of references at the end of each respective sub-section emphasizes the problem (which is not alleviated by the use of titles in German and English, respectively, for a reference to a paper by Ernst on pp. 32 and 83!). A minor point, in this connexion, is that although the reviewer has shirked the task of counting the number of separate, as opposed to duplicated, references, it is felt that the publishers' estimate of 6650 may be an unduly optimistic reflection of the mineralogists' zeal.

G. M. BROWN

FRONDEL (Clifford). *The system of mineralogy of James Dwight Dana and Edward Salisbury Dana, Yale University, 1837–1892.* Vol. III. *Silica Minerals.* 7th edn. New York and London (John Wiley & Sons, Inc.), 1962. xii+334 pp., 114 figs., 50 tables. Price 60*s*.

Volumes 1 and 2 of the 7th edition appeared in 1944 and 1951 respectively, and it was expected that volume 3 would cover silica and the silicates. In the event, Prof. Frondel has found it desirable to devote an independent volume to the polymorphs of silica. The new volume is distinguished by the accuracy and thoroughness that characterized the first two. After a short (8 pp.) introduction on the relations of the various polymorphs, and a note on other isostructural compounds and on ill-defined polymorphs, all the polymorphs of SiO_2 (except melanophlogite, which was rehabilitated too late for inclusion) are discussed in detail: 250 pp. are devoted to low-quartz, 8 to high-quartz, 24 to tridymite, 14 to cristobalite, 20 to opal, and 12 to keatite, coesite, and stishovite. A final 11 pp. are devoted to synthetic silica-glass, fulgurites, meteoritic impact glasses, etc. (but tektites are not discussed). The volume appears to be very free from errors, but there is one surprising omission: in 4 pp. devoted to liquid inclusions in quartz, the names brewsterlinite and cryptolinite, both due to J. D. Dana (Syst. Min., 3rd edn, 1850, p. 559; 6th edn, 1892, p. 1029), are not mentioned.

M. H. HEY