WADE (F. A.) and MATTOX (R. B.). *Elements of Crystallography and Mineralogy.* New York (Harper & Brothers—Harper's Geoscience Series), 1960, xiv + 332 pp., 18 tables, 327 text-figs. Price $7.50.

Pleasing to read and clear in layout and presentation, this elementary textbook is arranged in conventional manner and although modern in outlook has no pretensions to startling innovation. The authors state in their preface that they intend the book to be used in conjunction with a manual of determinative mineralogy (unspecified) and that they deliberately omit optical crystallography—so thoroughly, in fact, that the chapter on physical properties contains not even a passing mention of refractive index.

There are ten chapters, followed by an appendix (4 pp.) on stereographic projection, a mineral index (9 pp.), and a subject index (6 pp.): Introduction (4 pp.); A review of the concept of matter (10 pp.); The crystalline state (22 pp.); The classification of crystals (79 pp.); Crystal chemistry (20 pp.); Physical properties (12 pp.); Chemical properties (26 pp.); Descriptive mineralogy (99 pp.); Economic mineralogy (18 pp.); Genetic mineralogy and mineral associations (22 pp.). The chapter on the crystalline state is brief but adequate, and contains the elements of symmetrical and metrical crystallography. The chapter on the classification of crystals is concerned mainly with the 32 classes, with a short final section on twinning, habit, and types of aggregation; the treatment of the 32 classes is far too detailed for the intended readership, and the nomenclature is archaic—do we need to consider a 'positive left-handed rhombohedron of the third order' (p. 82) or a 'negative fourth-order prism' (p. 94)? The distinction as one of orders serves no useful purpose (F. C. Phillips, Introduction to Crystallography, 2nd edn, p. 65) and in any case the terms are not put to use in the descriptive section. The chapters on physical and chemical properties need little comment other than that made earlier, and that X-ray diffraction is rather oddly considered in the chemical section. The descriptive mineralogy seems to receive adequate treatment—the reviewer did not read every description, but noted that the commonest colour of phenakite (colourless) was omitted in favour of yellow, pink, or brown (p. 238), and that five of the six figures (on silicon–oxygen skeletons) had already appeared in identical form in the crystal chemistry chapter. The economic and genetic chapters are limited but good. The most damaging criticism of the book is that too little care has been taken in the correction of errors, and that several of the crystal drawings are horrible (especially figs. 4.12, 4.15, 4.32, and 4.33) in that parallelism of edges in a zone is frequently ignored

and that the cubic axial cross has the y and z axes at 90° in projection; figs. 4.148 and 4.149 (right- and left-handed quartz) have their captions interchanged. Wrong formulae appear, such as (Fe, Mn)WO_4 for wulfenite (table 4.2), $MgCl_2.6H_2O.8B_2O_3$ for boracite (p. 303), and $Ca_8B_{18}Cl_4.4H_2O$ for parahilgardite (table 4.8 and p. 322). Minor mis-spellings are not uncommon (olivene for olivine on p. 142, lazullite for lazulite, triphyllite for triphylite on p. 222, and Moh's for Mohs' on pp. 141 and 142, &c.), and major examples include lithiophyllite for lithiophilite (pp. 223 and 321) and desclosite for descloizite (p. 319). Astrakanite (spelled astraconite and astracanite), schönite (spelled schonite), and penta salt ought to give way to blödite, picromerite, and görgeyite respectively.

P. G. E.

SWINEFORD (A.), editor. *Clays and Clay Minerals.* Volume 8. Proceedings of the Eighth National Conference on Clays and Clay Minerals. London (Pergamon Press Ltd.), 1960, ix + 292 pp., 128 text-figs. and pls., 51 tables. Price 63*s*.

Like its predecessors [M.A. **13**–313; **13**–314; **13**–428; Min. Mag. **32**–258] this volume contains, either in full or in abstract, the papers presented at a National Conference on Clays and Clay Minerals (the 8th) sponsored by the Committee on Clay Minerals of the National Academy of Sciences—National Research Council and the University of Oklahoma, held at Norman, Oklahoma, on 11–14 October 1959. The first paper gives a well-documented account of the field excursion associated with this Conference. Of the other 21 papers and abstracts, 6 deal with clay–water or clay–solution aspects and 4 with geological or prospecting matters, the remainder covering such subjects as ion exchange, clay–organic complexes, alteration and synthesis, and diagnostic techniques. It would be impossible in a short review such as this to deal with each paper individually and it would be invidious to make a selection. Generally, however, it may be remarked that the quality of the papers is rather higher than in some of the previous volumes, and there are very few where one feels the authors might have developed their subjects more intensively. The general impression one receives is that the advances made in clay mineralogy over the past few years have been such that quantitative interpretation of phenomena, particularly in clay–water systems, is now possible by rigid mathematical and physical processes and that clay mineralogy is consequently rapidly developing from a somewhat speculative into an exact science. The amount of quantitative data presented in this volume is particularly striking. The