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 abstracts given at the commencement of each paper are concise and indicate very clearly the scope of the paper and the conclusions reached. The standard of presentation and publishing is excellent and the book is provided with a brief but adequate index. In the papers generally, there is more reference to work done outside America than has often been the case in previous volumes. The editor and printers are to be congratulated on the high standard attained and on providing a volume which will not only be essential to clay mineralogists but also to those interested in rheological and geological problems and to several branches of industry.

R. C. MACKENZIE

RUSSELL (R. D.) and FARQUHAR (R. M.). *Lead isotopes in geology.* New York and London (Interscience Publishers), 1960, 243 pp. Price $9.00 or 65*s*.

This monograph deals principally with the use of common lead in geochronology. As it includes a series of tables for deriving ages it is necessary to examine with some care the parameters selected for the basic equations.

Mathematical models for dating ordinary lead are of two kinds, depending on whether they postulate a uniform distribution of lead, uranium, and thorium in the source material or allow variation from place to place. In both cases the lead has grown from primeval lead by the addition of radiogenic isotopes from uranium and thorium. According to the first hypothesis, leads formed at the same time have the same isotopic composition. On the second, the composition depends on the proportions of primeval lead, uranium, and thorium in the source material as well as on age, but since ^{206}Pb and ^{207}Pb are decay products of a single element, there is a constant relationship between the ratios 206/204 and 207/204 in all leads of the same age; this is the basis of the Holmes–Houtermans method of dating. The age equations on both hypotheses incorporate the decay constants and the present-day ^{238}U/^{235}U ratio, all of which are tolerably well known, and make specific assumptions for the compositions of primeval and modern lead. Put in another way, the compositions of primeval lead (known from uranium- and thorium-free meteorites) and of a single ordinary lead of known age are sufficient to establish the equations for either type of model and, incidentally, to give the age of the earth.

The particular Holmes–Houtermans model in this book uses values