

PITCHER (W. S.) and FLINN (G. W.), editors. *Controls of metamorphism*. London (Oliver and Boyd), 1965. 368 pp. Price: 84s.

The book contains a collection of 20 papers presented at a symposium on the 'Controls of metamorphic crystallization' held in the Department of Geology, University of Liverpool, in January 1964. The papers provide both new data and valuable review material in the field of metamorphism, although they vary in the degree to which they embrace the actual *controls* of metamorphic processes. It is unfortunate that the discussions, even in some edited form, were not included in the book. Nevertheless, the book provides some of the most up-to-date data and interpretations on the subject and will find a place on many petrological bookshelves despite its not inconsiderable price.

1. 'Introduction'. W. S. Pitcher. pp. 11-21. 2. 'Some recent advances in our understanding of the controls of metamorphism'. J. Sutton, pp. 22-45. 3. 'Deformation in metamorphism'. D. Flinn. pp. 46-72. 4. 'Nucleation and growth of metamorphic minerals'. N. Rast. pp. 73-102. 5. 'The science of metamorphism in metals'. D. McLean. pp. 103-118. 6. 'Tectonic overpressures'. R. W. R. Rutland. pp. 119-139. 7. 'Factors in the study of metamorphic reaction rates'. E. D. Lacy. pp. 140-154. 8. 'The study of mixed crystals of minerals in metamorphic rocks'. E. Hellner, Th. Hinrichsen, and F. Seifert. pp. 155-168. 9. 'The chemical significance of isograds'. M. P. Atherton. pp. 169-202. 10. 'Experimental anatexis and genesis of migmatites'. H. von Platen. pp. 203-218. 11. 'The nature and origin of migmatites: metasomatism or anatexis'. B. C. King. pp. 219-234. 12. 'Isotopic dating of metamorphic rocks'. S. Moorbath. pp. 235-267. 13. 'Some comments on the application of experimental results to the study of metamorphism'. W. S. MacKenzie. pp. 268-273. 14. 'The iron-titanium oxide phases in metamorphism'. M. I. Abdullah. pp. 274-280. 15. 'The composition of garnet in regionally metamorphosed rocks'. M. P. Atherton. pp. 281-290. 16. 'Compositions of micas in metamorphic rocks'. B. C. M. Butler. pp. 291-298. 17. 'The relationship between composition of calciferous amphibole and grade of metamorphism'. B. E. Leake. pp. 299-318. 18. 'The pyroxenes of metamorphic rocks'. R. A. Howie. pp. 319-326. 19. 'The aluminium silicate polymorphs'. W. S. Pitcher. pp. 327-341. 20. 'Crystallographic aspects of feldspars in metamorphism'. W. L. Brown. T. W. B.

RICH (C. I.) and KUNZE (G. W.), editors. *Soil clay mineralogy, a symposium*. N. Carolina (Oxford Univ. Press), 1965. xvi+330 pp. Price: 64s.

This book is the record of a seminar held at the Virginia Polytechnic

Institute. The contributors are leading exponents in the field of Clay Science and deal with the origin of soil clays, the techniques such as X-ray diffraction, electron microscopy, d.t.a., and chemical analysis. As this is a record of the seminar it suffers from not being primarily designed for the written text, and some parts are difficult to follow. Most of the contents could be found dealt with more adequately in other texts, but as an introduction to the science of soil-clay mineralogy it serves a useful purpose.

H. G. MIDGLEY

ROSENFELD (Andrée). *The Inorganic Raw Materials of Antiquity*. London (Weidenfeld and Nicolson), 1965. 245 pp. Price: 45s.

The first three chapters are concerned with the description of minerals and rocks. The reader is taken briefly through the atomic structure of minerals with special emphasis on the silicate structure. The physical properties are well presented: one criticism is the use of the strong parallel lines used as shading, which gives a false impression of cleavage traces. The discussion of igneous and metamorphic rocks could well have considered the structural and textural features of these rocks in hand specimen more fully. The chapter headed 'The Products of Weathering' deals mainly with sedimentary types: it appears unusual to place the deposits of organic origin under this heading.

The more common metalliferous minerals are described and their occurrence noted: it could add interest in relation to the sources of the tools of antiquity if some of the more famous localities, from which the minerals come, were named. The conditions of smelting in antiquity are discussed and it is shown why copper, silver, lead, and tin were used in early work whilst such metals as aluminium and magnesium remained undiscovered.

The raw materials of the tools, weapons, ornaments, and pigments are interestingly described and the physical features are related to the usefulness of a material for a particular purpose as, for example, the production of a durable cutting edge. The mining and quarrying of raw materials in antiquity is considered.

The importance of the study of raw materials in relation to their source and importation to the site where they were used is considered. For example, it is shown that lapis lazuli occurred in restricted areas in Western Asia and so flowed out along trade routes from these points or that the location of turquoise and tin in Sinai caused Egyptian expeditions to go there in order to get their supplies. Consideration is given to the dating of artifacts and materials. The recent method in the dating of