

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

obsidian by considering the depth of the hydrated outer shell, the potassium-argon method in dating rocks and the thermo-remnant magnetism method in respect of clays are all touched upon.

This is a book well worth reading both by the amateur and professional worker.

BRIAN SIMPSON

WINKLER (H. G. F.). *Die genese der metamorphen gesteine*. Berlin (Springer), 1965, 218 pp., price 19.80 DM (approx. 36s.).

1. 'Definitions and types of metamorphism'. 2. 'Agents of metamorphism'. 3. 'Concept of metamorphic facies'. 4. 'Metamorphic mineral reactions in carbonate rocks'. 5. 'Graphic representation of metamorphic mineral parageneses'. 6. 'Hornfels facies of contact metamorphism'. 7. 'Regional dynamo-thermal metamorphism'. 8. 'Facies of Barrovian type'. 9. 'Facies of Abukuma type'. 10. 'Intermediate facies'. 11. 'Granulite facies'. 12. 'Eclogite facies'. 13. 'Changes in mineral composition with increasing metamorphic grade'. 14. 'Depth metamorphism'. 15. 'Temperature and pressure in dynamo-thermal metamorphism'. 16. 'Anatexis, migmatite formation and palingenetic granitic magma'. 17. 'Appendix: Nomenclature of common metamorphic rocks'.

The book meets a demand for a reasonably priced modern text on metamorphic petrology, and forms a good foundation for honours and advanced work in the subject. In the foreword the author acknowledges the influence of textbooks by Turner and Verhoogen (1960) and Barth (1962) in his general treatment of the subject. The first two chapters offer some general information on phase-rule and thermodynamics without recourse to mathematical detail and succeeding chapters follow the scheme outlined above. The construction and use of ACF diagrams is considered at some length and good explanations are given for the mineralogical and chemical manipulations involved. One criticism: reference to previous original work is frequently omitted or wrongly assigned, particularly in the sections dealing with carbonate rocks and glaucophase schists.

Of particular interest is the section on anatexis, migmatites, and granitic magma, which, on the basis of Tuttle and Bowen's (1958) work on the granite system and Winkler's (1961) on experimental melting of sediments, provides one of the best chapters and a fitting finale. It is to be hoped that the publishers will present an English translation as soon as possible.

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