BOOK REVIEWS

DETERMINATION MICROSCOPIQUE DES MINÉRAUX DES SABLES, by Solange Duplaix. 2nd Edition. 96 pages, 75 illustrations. Librairie Polytechnique Ch. Béranger, Paris and Liège. 1958. Price in France not known but 26 shillings in England.

This book commences with a short, superficial treatment of the methods of preparation of sediments of different types for heavy liquid fractionation, and a discussion of separatory techniques. In dealing with heavy media the diluents or wash liquids suggested for use with bromoform do not seem to be the most convenient ones since mixtures of bromoform and diiodomethane are often employed. The short section that follows immediately thereafter briefly touches upon the Becke bright line test, refractive index liquids, procedure for examining mineral fractions, and grain counting.

The major portion of the book is taken up with listings and discussion of the properties of minerals commonly found in sediments; 59 of them are arranged in alphabetical order. On turning to actinolite, the first mineral to be discussed, one is surprised to find the composition of this amphibole expressed as $Ca\ (Mg, Fe, Mn)_3\ Si_4O_{12}$, and after having read through the mineral descriptions that follow, one realizes that the chemical compositions listed by the author for crossite, glaucophane, riebeckite, and tremolite are, in every instance, completely inaccurate. The reviewer has excluded green hornblende from this observation since the composition is given in the broadest terms only, but it would have been helpful not to have labelled green hornblende a metasilicate. There are so many inaccuracies in the formulae of the amphiboles named that it is pointless to discuss them, except in one particular case, viz. the author's omission of hydroxyl. The rôle of water in tremolite and other amphiboles was carefully studied by Allen and Clement in 1908, and later W. T. Schaller pointed out the need to consider amphiboles as hydrous minerals. Then in 1929–30 Warren, Kunitz, and others should have left us in no doubts about this question. How long are we to wait before some notice is to be taken of these data?

For each mineral an outline of the main physical properties is provided but often the data provided are misleading, since they tend to suggest that a particular mineral may be recognized by a set of rather precise constants. For instance, the refractive indices listed for allanite may be correct in so far as one particular specimen is concerned, but they do not reflect the very wide range of values that are commonly found. Furthermore, the data also suggest that allanite and zircon are always anisotropic; very often this is not so. In the same way we find the refractive indices of tourmaline given to four significant figures as $N_g = 1.6435$ and $N_p = 1.6222$; this is quite misleading. Similarly it would have been more helpful if the empirical formulae had been expressed in such a way that some recognition were given to the accepted silicon-oxygen ratios in the different silicate groups; the formula for biotite is a case in point. Then, on the other hand, a number of inaccuracies are present. For example, since the vibration direction $Z = b$, and it is the acute bisectrix for light of all wavelengths in brookite, an optic axial plane cannot be parallel to (010) under any set of circumstances, and again the elongation of crossite may also be parallel to Y.

The formal descriptions of each mineral are complemented by short statements that deal with frequency of occurrence in sediments, diagnostic properties, and suggestions for ease of recognition. In the author's treatment of xenotime, an often quoted statement is repeated viz. that it is necessary to employ spectroscopic methods in order to distinguish between xenotime and colored (presumably yellow) zircon. This is, of course, unnecessarily misleading, since distinction between these minerals on the basis of refractive index is so simple, and yet so completely unambiguous. Furthermore, the reviewer may add that similar means will permit one to distinguish quickly between monazite and zircon. If sulphur-saturated diiodomethane is employed as immersion liquid, then one will find that α for

xenotime is always much less than the liquid; α for monazite is about equal to it, whereas the same vibration direction for zircon has a refractive index that is very much greater.

Seventy-five nicely executed figures, not sixty-nine as stated on the title page, have been provided to illustrate the characteristic form and general appearance of twenty-six of the fifty-nine minerals listed.

Tables in which minerals are listed according to density, refractive index, birefringence, and color are provided together with an inadequate bibliography and an index.

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DONNÉS DES PRINCIPALES ESPÈCES MINÉRALES. By RAYMOND FISCHESSER. J. and R. Sennac, 54 rue du Faubourg Montmartre, Paris 9e, France, 1955. 660 pp. 5200 fr.

Although this book was published in 1955, it unfortunately has not received any notice in the *American Mineralogist*. It is a compilation of determinative data on the principal mineral species, brought together by Raymond Fischesser, who is the chief Engineer of Mines and Assistant Director of the National School of Mines, Paris. The book consists of a series of abbreviated descriptions of most of the important rock-forming minerals, as well as of many of the less common ore and gangue species.

The arrangement of the descriptions departs radically from those in most descriptive mineralogical texts. The minerals are arranged into three major groups, 1) the silicates, 2) elements of mineral deposits, and 3) mineralizers and metallic minerals. These three major subdivisions are further broken down into 13 subgroups, the first four of which fall under the silicates (Group I). These are: Division 1) Essential rock silicates, 2) Metamorphic silicates, 3) Accessory rock silicates, 4) Alteration silicates and secondary silicates. In Part II, Division 5 describes the minerals of gangue assemblages and 6) the minerals of evaporite deposits (odd bedfellows indeed). In Part III there appear the following divisions: 7) Mineralizers and minerals of the acid-forming metals, 8) Sulfides, 9) Oxides, 10) Alteration minerals of sulfides and oxides, 11) Rare earth and uranium minerals, 12) Copper minerals, and 13) Minerals of the precious elements. Obviously this sort of arrangement, while attempting to be primarily genetic in character, contains categories of non-genetic aspect. Thus the classification, which attempts to ground itself on paragenesis, fails in certain respects.

Part IV consists of the synoptic tables, of which there are seven: Table 1, Classification by crystal system and specific gravity; Table 2, by habit and form; Table 3, by occurrence in hydrothermal deposits, using the subdivisions hypothermal, mesothermal, leptothermal, and epithermal; Table 4, by color; Table 5, by various physical properties including a) streak, b) feel, c) sectility; Table 6, by fluorescence; Table 7, by index of refraction; Table 8, by blowpipe tests, including those in closed tube, in open tube, on the charcoal block, bead tests, various reactions, and finally, chemical characteristics of the principal elements. The book concludes with a species index and with a bibliography.

Each of the species is described under the following headings: varieties, associated minerals, occurrence and deposits, crystal structure, form, physical properties, chemical properties, and alteration. For most species there are included drawings of crystals or aggregates. On these drawings faces are designated by letter symbols, but these are not identified in terms of Miller indices, although angles between certain faces are listed. One of the chief omissions is the absence of any x-ray data whatsoever.

The book is sectioned by means of a series of heavier sheets which form divider pages for the various groups, and to these are attached index tabs which permit easy access to

any of the groups or subgroups and thus to the various species, provided the reader can remember into which of the various "genetic" categories the author has placed a particular species; otherwise it is still necessary to refer to the species index. The book is incomplete with respect to mineral identification at the advanced level, particularly in its almost total disregard of major chemical variations in species and series and in the relation of this variation to variations in optical and physical properties. To the absence of basic data on this phenomenon in even "elementary" mineralogical reference works this review is a threnody. If indeed, as the author suggests, the work is to be considered as a "Mineralogical dictionary," then it must be reported that several aspects of its "definitions" are sterile.

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PRÉCIS DE PÉTROGRAPHIE, Roches Sédimentaires, Métamorphiques et Éruptives. By Jean Jung. Masson et Cie, 120 Blvd. St. Germain, Paris 6e, France, 1958. 314 pages, with 160 figures, 20 plates, $24\frac{1}{2} \times 18\frac{1}{2}$ cm. 3600 fr.; bound, 4600 fr.

This is a good general presentation of the fundamental petrography of the major rock types. It is based on a series of lectures to students and consists of four parts. The initial section (48 pages), which deals with the rock-forming minerals, has its first part (the silicates) subdivided on the basis of the linkage of silica tetrahedra. This part is followed by descriptions of minerals other than silicates. Part one concludes with a table giving, in highly abbreviated form, some of the optical characteristics of the significant rock-forming minerals. The table is too generalized to be of much value in mineral determination, and the section contains but two charts (for the plagioclases) relating optical to compositional variation.

Part two (90 pages) deals with sedimentary rocks and is graced with some excellent photographs, both of hand-specimens and of these rocks in thin section, as well as a few electron micrographs of some of the clay minerals. In addition, there are numerous clear and carefully delineated drawings of various rock thin sections. In fact, these drawings constitute one of the major attractive features of the book. Part three, dealing with metamorphic rocks, consists of 51 pages and, like its counterpart on the sediments, is prefaced by a very brief and general discussion of genetic principles. Again both photographs of hand specimens and drawings of the rocks in thin section serve admirably to illustrate the major varieties. The last section, on igneous rocks (eruptive rocks) consists of 104 pages and has a slightly more extensive section dealing with the origin of these rocks and with their structures and textures.

For English workers the book is well designed to serve as a reference work, especially to outline adequately the French presentation of systematic microscopic petrography. The book is aptly titled; it is indeed a précis of microscopic petrography. Unfortunately, the price seems to be inordinately high for students and, as is apparently customary for most French books, the table of contents is last, an arrangement which, to the reviewer, seems as useful as concluding a scientific article with its abstract.

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