BOOK REVIEWS

GEOLOGIE UND BODENSCHÄTZE AFRIKAS, by Erich Krenkel. 2nd ed., Akad. Verlagsgesellschaft Geest & Portig K.-G., Leipzig, 1957, xvi+597., 158 illustrations, DM. 61.00.

Dr. Krenkel, who is Professor Emeritus of Geology at the University of Leipzig, has completely reworked his authoritative work on the geology of Africa. The first edition, which appeared in 1939 in three volumes, contained 1900 pages of text and over 450 illustrations and tables. It was part of the famous series "Geologie der Erde" published by Gebrüder Borntraeger, Berlin. The second edition, which, of course, has been greatly shortened, has many parts that were completely reworked and also contains new chapters dealing, e.g., with such features as orogenies, guiding lineaments, and magmatic periods. To the compilation the author brings an abundance of personal experiences and investigations: in Morocco, Algeria, Tunis; in Egypt, Eritrea, Uganda, Kenya, and Tanganyika; and in South Africa and the Congos.

The book is divided into two parts: I, The Geology of Africa, and II, The Ore Deposits of Africa. The geology is described in terms of the following general regions: The Atlas, Sahara, Red Sea Graben, Syrabia, Abyssomalia, East Africa, Madagascar, South Africa, the Congo Basin, Guinea-Sudan, and the Atlantic Islands. Most of these sections are further subdivided on an areal basis, as, for example, in the section on South Africa: 1. The eastern stem—the Rhodesian shield, the Transvaal, the Lebombo zone, the Karroo basin, the Cape, the coastal sedimentary strip, and the Kalahari region; 2. The western stem—the Nama Massif, the Samara Massif, and the Namib. This part, which consumes 486 pages of the book, concludes with a general summary—Africa in retrospect.

Part II is split into a section on "ores"; i.e., deposits yielding metals, thus including bauxite; and one on non-metallic deposits. A noteworthy omission is the absence of information on the Rand uranium, which is mentioned but briefly under Gold but not at all under Uranium.

Each part is followed by its own index—not a particularly convenient arrangement. The book concludes with two bibliographies, one for each part. The older literature of 2400 entries, listed in the first edition, is not repeated in the second, in which only selected newer references are cited.

It is unfortunate that the second edition could not be published in the detail and style of the first; nevertheless it is a most welcome modernized and succinct account of the geology of an entire continent. The illustrations, especially the numerous maps and sections, are generally excellent, but the half-tone reproductions are poor owing to the quality of the paper. The book clearly belongs in the library of anyone interested in the geology of Africa.

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ELEMENTS OF CRYSTALLOGRAPHY AND MINERALOGY, by F. Alton Wade and Richard B. Mattox. xiv+332 pages. Harper & Brothers, New York, 1960. Price $7.50.

According to the editor's introduction to this new member of Harper's Geoscience Series, the book lies "in the middle ground between the orthodox and the novel" in the "search for new ways of handling beginning mineralogy." The book contains 10 chapters: 1. Introduction; 2. A Review of the Concept of Matter; 3. The Crystalline State; 4. The Classification of Crystals; 5. Crystal Chemistry; 6. Physical Properties; 7. Chemical Properties; 8. Descriptive Mineralogy; 9. Economic Mineralogy; 10. Genetic Mineralogy; Mineral

Associations. An appendix is devoted to the construction of the stereographic projection, and there are mineral and subject indexes. Of the approximately 450 names in the mineral index over 200 are described in detail. Tables for the determination of minerals are not included.

After brief histories of mineralogy and crystallography are given in the introduction, the constitution of crystalline matter is introduced. Beginning with atoms the writers develop the ideas of atomic bonding, lattices, crystal symmetry, and finally crystals. The presentation of crystal form names which cut across systems is especially effective with the accompanying drawings. No attention is paid to goniometry and mathematical relationships. All 32 symmetry classes are presented in tables along with Hermann-Mauguin symbols, symmetry elements, and mineral examples. However, only the more common classes in the mineral kingdom are discussed in detail. For each of these there are excellent line drawings showing the symmetry elements, forms, combinations of forms, and a stereogram. Unfortunately the crystallographic axes are not indicated on the stereograms, an omission which might lead to some confusion, especially in Fig. 4.181, where the monoclinic *b* axis is in the center of the projection. In a separate section twinning is discussed and illustrated by good line drawings for each of the systems. Terms used for crystalline aggregate structures are defined and photographs illustrate many of these terms. The writers do not indidate if cerussite is the mineral which illustrates the reticulated habit in the photograph of Fig. 4.241. Crystal chemistry, the last topic considered in crystallography, includes atomic and ionic packing, along with the concepts of radius ratio and coordination number. This section probably would have fit in better where atomic bonding and the crystalline state are discussed earlier. Other things considered here are chemical formulas, isomorphism, polymorphism, pseudomorphism, and mineral classification. The classification of nonsilicates is covered briefly in less than a page, while ten pages are devoted to the silicate minerals.

The usual physical properties of minerals are summarized, followed by a list of properties not generally used in routine analyses, e.g., electrical conductivity, piezoelectricity, heat of inversion, specific heat, etc. Standard blowpipe reactions are outlined for 46 elements. Other analytical techniques briefly touched upon are spectrochemical analysis, *x*-ray diffraction, spot test methods, and differential thermal analysis. These topics no doubt illustrate that "the reader is constantly reminded of the highly specialized and difficult phases of the subject at the very time he is handling concepts and materials which . . . he can readily comprehend," a statement made in the editor's introduction.

In the descriptive section the minerals are arranged according to Dana's *System of Mineralogy*, 7th edition. Although the descriptions are quite complete and accurate the section could be improved in several ways. A discussion of mineral groups is almost wholly lacking in the systematic presentation. For example one finds no mention of the spinel group, the rutile group, the calcite group, the aragonite group, as well as many others. Some of the silicate groups are mentioned, but, except of the garnet group, only briefly in the general discussion of the classification of the silicates. Although the silicates are classified on a structural basis, the writers have retained the older classification names based on the hypothetical silicic acids. No figures appear in the descriptive section except for those illustrating silicate structures, and illustrations identical to these appeared earlier in Chapter 5. In the preface the authors explain that figures are absent because the student is expected to have mineral specimens available while using the book. There are a number of mineral name misspellings, e.g., cerussite (pp. 211, 212, 280), triphylite (pp. 222, 223), lazulite (pp. 222, 227).

In the economic section 28 elements are listed in alphabetical order, and their ores, uses,

and chief producing areas are discussed. This is followed by nonmetallic minerals used for abrasives, gems, fertilizers, etc.

The chapter on genetic mineralogy and mineral associations is especially good. The formation of minerals from melts (magma), sublimation, water solutions (hydrothermal, evaporation, ground water), metamorphism, etc. is treated. Chemical reactions including numerous equations are given, as well as lists of minerals which occur in each mode of formation.

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GESTEINS- UND LAGERSTÄTTENBILDUNG IM WANDEL DER WISSENSCHAFTLICHEN ANSCHAUUNG (The formation of rocks and ores scientifically considered), by WALTHER FISCHER, 592 pages, 12 plates, 12 figures, 36 tables in the text and on 4 inserts. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart. 88 marks ($22.00).

This is an elaborate compendium of the historical development of the sciences of petrology and mineral deposits, with reference to the work of some 2400 authors. The index of some 3000 entries includes reference to localities and to minerals, rocks, geological structures, and concepts and theories. In short, the student will find information, historical and expository, on almost any topic in these fields of science. The twelve plates comprise several dozen excellent portraits of famous petrologists.

There is no equivalent work in the English language, and it will be found most useful as a key to the older literature.

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