water hydraulics. Nevertheless, it is interesting to note that Polubarinova-Kochina's book also reflects some provincialism. Of more than 300 literature citations, less than 10 percent are of non-Russian origin, and most of these are such well-known classics as Prandl's work on fluid mechanics and Carslaw and Jaeger's work on heat conduction. There are no references to current literature published in non-Russian journals. Despite this limitation, the book is a highly important reference work in which the different approaches used in familiar problems together with a number of unique solutions to new problems will be of great interest to ground-water specialists in this country.

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Dana's System

The System of Mineralogy of James Dwight Dana and Edward Salisbury Dana. Yale University, 1837–1892. vol. 3, *Silica Materials.* Revised and enlarged by Clifford Frondel. Wiley, New York, ed. 7, 1962. xii + 334 pp. Illus. $7.95.

The System of Mineralogy of James Dwight Dana, first published in 1837, has had a long and deservedly illustrious career. The volume, a foremost authoritative reference source throughout its long history, was one of the more famous products of American science during the 19th century. Clifford Frondel of Harvard, co-author of volumes 1 and 2 of the seventh edition (with the late Charles Palache and Henry Berman), renders a further service to mineralogy as the sole author of volume 3.

The great proliferation of mineralogical studies after the appearance of the fifth edition (1868), which were precipitated by the introduction of sophisticated optical measurements to mineralogy, led to the rigorous and critical system of condensation and abbreviation devised by Edward Salisbury Dana, the author of the sixth edition (1892). The format of that justly famous edition had, necessarily, to be changed somewhat for this edition, because the intervening years witnessed an even more striking period of discovery and understanding that resulted from the increasingly widespread use of x-ray diffraction. The volume of data on minerals had grown so large by the time work commenced on the seventh edition that it was decided to publish the system in three volumes. Volume 1, *Elements, Sulfides, Sulfosalts, Oxides*, appeared in 1944, and volume 2, *Halides, Nitrates, Borates, Carbonates, Sulfates, Phosphates, Arsenates, Tungstates, Molybdates*, in 1951. The initial plan was to cover both silica and silicate minerals in volume 3, but the volume was restricted to the silica minerals alone. Two additional volumes are now proposed to cover the silicates, thus bringing this edition to a total of five volumes.

Despite the crystal chemical classification that, in this edition, replaces the older chemical system of the sixth edition, the sixth edition's critical selection of referable topics and its convenient condensation of data were retained as guiding principles in volumes 1 and 2. With the advantage of a more restricted range of compounds to discuss, Frondel has followed a stated intent to produce an "entirely rewritten and greatly enlarged" volume 3 by rejecting the brevity of the previous volumes. He has produced an interesting but somewhat unbalanced volume that retains the necessary dictionary arrangement of information but which also provides extensive discussions of the vast amount of work done on morphological variations, twinning, crystal physics, compositional variations, and varietal forms of quartz. Two hundred and fifty pages are devoted to quartz alone, a remarkable increase from the ten pages of the sixth edition; this reflects not only a great expansion of the topics selected for discussion, but also the vast amount of work done on quartz, much of it stemming from the widespread use of quartz oscillator plates.

The vital role of x-ray diffraction in mineralogy is emphasized more strongly than in volumes 1 and 2, and complete x-ray powder diffraction tables are included for the first time. A complete list of the interplanar spacings for quartz, and of their diffraction angles for Cu, Co, Fe, and Cr radiations, indicates the widespread use of quartz as an internal measurement standard in x-ray diffraction studies. It is unfortunate that the necessary thermal expansion data were not included so that this valuable table could be equally useful at temperatures other than 25°C.

Volume 3 is easy and interesting reading that will appeal to many scientists as well as to professional mineralogists. Although the extreme emphasis given to quartz results in imbalance and its length reduces its usefulness as a ready reference source, volume 3 is an extensive and impressive compilation that must be on the bookshelf of every serious mineralogist.

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British Scientists

Charles Lyell (*British Men of Science*, vol. 1. Sir Gavin de Beer, General Editor). Sir Edward Bailey. Doubleday, Garden City, N.Y., 1963. x + 214 pp. Illus. $3.95.

Sir Charles Lyell wrote the best and still the most rewarding of geological textbooks, *Principles of Geology* (3 vols., 1830 to 1833). Now Sir Edward Bailey, one of the best known of British geologists, has written a thoughtful and entertaining biography of Lyell that puts the great man in context, with respect to Lamarck, Hutton, Darwin, Chambers, Agassiz, and others.

Lyell also wrote *Travels in North America* (1845), *A Second Visit to the United States of North America* (1849), and *The Geological Evidences of the Antiquity of Man* (1863), but the eleven editions of *Principles*, the final one in 1872, were his glory. Darwin took the first edition with him on the "Beagle" and became one of the thousands caught by its spell and educated by its thoroughness and clarity.

Lyell's marshalling of the evidence for the enormous length of geologic time profoundly affected Darwin, but Lyell himself was a reluctant organic evolutionist. Bailey makes clear Lyell's early coolness toward Lamarck and the slowness with which he accepted Darwin's evidence for evolution. Lyell, who was born near the Highland Border, was one of the first to acclaim Agassiz's recognition, in 1840, of the effects of Pleistocene glaciers and glacier-dammed lakes in and near the Highlands. His fellow members of the Geological Society of London were violently hostile and so shook his first confidence that he became a partial doubter himself and helped hold back for 20 years the recognition by Britons