five volumes may be to bring English-speaking readers up to date on the work of some of their European colleagues. Translations of Russian literature are now fairly readily available and are thus frequently cited, but except for these, reference to the European literature is often completely absent from papers in English.

The present volume is not devoted exclusively to hydrothermal systems but treats carbonate-silicate systems and their relation to problems of carbonatites. A review of high-pressure apparatus is also included, but it is difficult to understand the omission of internally heated vessels used so extensively by Yoder, Burnham, Tuttle, and others when the cold-seal vessels and "Morey bombs" are described in detail. Further criticisms may be made of a style of sentence construction that is often unwieldy and sometimes ambiguous. The text is liberally illustrated, but as with many reference books of this type, most of the figures are too small to serve any practical purpose. Faults, however, are minor in comparison with the overall value of the volume. The author is to be complimented on his most comprehensive and systematic presentation of a large quantity of data. All those associated with any aspects of teaching and research in silicate chemistry will find this and, I am sure, the other four volumes of *Silicate Science* most useful in their work.

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Water in Solid Form

Traité de Glaciologie. LOUIS LLIBOUTRY. Vol. 1, *Glace, Neige, Hydrologie Nivale.* 433 pp., illus. 140 F. Vol. 2, *Glaciers, Variations du Climat, Sols Gelés.* 616 pp., illus. 190 F. Masson, Paris, 1964–65.

Glaciology, defined as the study of snow and ice in all forms, and not simply—as too many still hold—the study of glaciers, has gained considerable momentum in recent years, especially since the commencement of the International Hydrological Decade. Fifty to 80 times more water is stored in solid form than exists in all freshwater bodies. Following on the recognition of the practical importance of snow and ice, glaciology has emerged as an interdisciplinary science which requires an essentially interdepartmental academic training. Consequently the need has arisen for both a basic introductory textbook for the students and a comprehensive, authoritative handbook for the specialist. Lliboutry's massive two-volume work is an admirable effort to provide a handbook. It is well organized and clearly written, and contains many excellent diagrams and photographs.

The author, a geophysicist with a wide range of knowledge and experience, is a professor at the University of Grenoble and director of the laboratory of glaciology at the Centre National de la Recherche Scientifique. In these volumes he reviews, abstracts, and critically discusses an enormous amount of literature, covering not only the easily accessible publications in French, English, and German but also those in Russian, Japanese, and other languages. The sheer task of assembling such a mass of material is formidable. The coverage is up-to-date, reference being made to 1964 and 1965 publications. Each of the 23 well-conceived chapters has its own extensive bibliography. There are, however, instances of criticism of work which is not fully identified in the references, so that it is difficult for the reader to form an independent judgment, and there are a number of minor errors in the references.

The author succeeds in combining theoretical, experimental, and field evidence on a multitude of topics covering the whole field of glaciology. Consideration is given to the physics, mechanics, and petrography of ice; the formation of solid precipitation; snow cover with creep and avalanche problems; snow and ice engineering; heat balance of snow and ice surfaces with associated hydrological and morphological factors; the temperature pattern and heat flow in snow and ice; the characteristics and distribution of glaciers; mass balance; movement; geophysical study techniques; deformation morphology; internal motions and bottom gliding; erosion and deposition of material; glacier fluctuations and the relationship to elimate; the main glaciations with their causes and effects; and frost action in the ground. Though the balance is generally well kept, there are certain cases of over- or under-emphasis; sea ice, for example, deserves a more exhaustive consideration.

The great merit of this treatise, and that which distinguishes it from earlier compendiums, is that it establishes glaciology as the science which treats quantitatively the whole range of processes associated with solid water. The synthesis is contingent upon the continual consideration of physical principles. On occasion the author emphasizes his own opinion on a currently debated problem where it would have been more appropriate simply to report the various ideas as, for example, concerning the sliding of glaciers on their beds. But it is always possible to level some criticisms at a book of such magnitude and diversified scope. These cannot detract from the integral importance of the whole. The *Traité de Glaciologie* is the only comprehensive single work on glaciology, and encompassing, as it does, such a variety of topics from traditionally separated disciplines, it is a landmark in the development of that science.

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Major French Influence

The Development of Technical Education in France, 1500–1850. FREDERICK B. ARTZ. Society for the History of Technology and M.I.T. Press, Cambridge, Mass., 1966. 286 pp. $7.95.

The publication of this volume in 1966 will seem to many an anachronism, since three of the four chapters are essentially unaltered translations of articles written by the author for French historical journals in 1937, 1938, and 1946. As the footnotes reveal all too clearly, Artz has not seriously attempted to bring the results of his research abreast with current knowledge. This is a serious flaw, especially since much has been uncovered that illustrates Artz's themes better and more succinctly, and occasionally contradicts his views. Among the recent works, the most significant is the 700-page volume *Enseignement et diffusion des sciences en France au XVIII^e siècle* (Hermann, Paris, 1964), which covers much of the same ground, but with considerably more evidence taken directly from archival sources. For all practical purposes, one can think of Artz's volume as having been published in 1950.

It is nonetheless very useful. Historical works do not age as quickly as much of scientific research. The book is a mine of bibliographical references to articles in obscure journals, of factual information concerning French educational theories and practices, and,