The bulk of Sherwood's *Exploration* deals with government-sponsored research, the major purpose of which was to open up new land. The explorations of Raymond, Allen, Abercrombie, Cantwell, Stoney, and others are discussed in detail as are the more specifically scientific contributions of Nelson, Turner, the Krause brothers, and Jacobsen. The role of prospectors and missionaries is also examined, and in the last chapter there is emphasis on the work of the United States Geological Survey and the important contributions made by A. H. Brooks. The author concludes, as he began, by noting that the "progress of discovery was consistent with social attitudes in the United States, the remoteness of the territory, the economic interest expressed in the country, and the popular interest as evidenced by the population of the region" (p. 187).

The very excellence of Sherwood's book, which will surely be a basic source for many years to come, serves to call attention to the fact that there is nothing comparable on the exploration of Russian America. A really thorough, well-documented history of Russian exploration in Alaska is badly needed. Although the scientific contributions of Russian explorers were less notable than those of their American counterparts, important and significant observations were nevertheless made on the native peoples, the geography, and the resources of the country. Much of the archival material for such a study is available in this country, and Soviet historians are increasingly turning their attention to Alaska and have published useful material in recent years. Perhaps the approaching centennial year will provide the impetus for a history of Russian exploration. If it does, and if the resulting volume is as carefully researched and well written as the one reviewed here, the cause of Alaskan history will be very well served indeed.

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A History of Mathematical Approaches

Ways of Thought of Great Mathematicians. An approach to the history of mathematics. Herbert Meschkowski. Translated from the German edition (Berlin, 1961) by John Dyer-Bennett. Holden-Day, San Francisco, Calif, 1964. x + 110 pp. Illus. Paper, $3.95; cloth, $5.95.

Meschkowski selected nine men whom he felt illustrated "the ways of thought of mathematicians of earlier centuries"—the Pythagoreans, Archimedes, Nicholas of Cusa, Blaise Pascal, Gottfried Leibniz, Carl Gauss, George Boole, Karl Weierstrass, and Georg Cantor.

As the author indicated in the preface, most of the choices were somewhat arbitrary, but some were selected to support the thesis that earlier mathematicians were willing to investigate problems that could not be resolved solely by mathematical methods.

In the first chapters of the volume, the "way of thought" is identified and mathematical examples are used to illustrate it. For example, Archimedes is used to demonstrate that mathematicians could be both "pure" and "applied" in their thinking. Two examples from the work of Archimedes are used to support this observation: the first is a rigorous, geometrical proof of a theorem concerned with the area of a spherical surface, and the second is a heuristic argument that involves the determination of the equilibrium state of a lever in order to find the volume of a sphere. In the chapters that follow, the examples speak for themselves in illuminating the particular "way of thought."

The chapter on Gauss illustrates the principle of *pauca sed matura*, and the major portion of the chapter contains an analytic proof of the fundamental theorem of algebra published by Gauss in 1816. This proof demonstrates the Gaussian ability to compress a mathematical discussion into its most simple and elegant form. Some historians may feel that the works of Gauss better illustrate other avenues of thought of a great mathematician, but it is doubtful that any would quarrel with the claim that Gauss was truly a master of elegance in mathematical proof.

This brief volume is an excellent complement to the many comprehensive histories of mathematics.

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Solar Energy: Future Research

Direct Use of the Sun's Energy. Farrington Daniels. Yale University Press, New Haven, Conn., 1964. xviii + 374 pp. Illus. Paper, $2.45; cloth, $7.50.

The enormous amount of solar energy falling on large areas of the earth's surface is impressive and frustrating, for man feels that he should utilize this energy with reasonable efficiency. Indeed, by planting and harvesting crops, man does utilize it, but at low efficiency and in relatively short time. Or man burns rapidly fossil fuels that have required eons to accumulate. But what one really wants is a large amount of energy, spontaneously regenerated as rapidly as it is utilized and converted to power at a reasonable efficiency.

Farrington Daniels is an authority who writes lucidly and logically on the utilization of solar energy. He recognizes clearly the challenge, the limitations, and the practicalities. To anyone who desires a concise and readable review of the subject, with complete references, this book is highly recommended.

Daniels, professor emeritus of physical chemistry at the University of Wisconsin, clearly demonstrates his years of wisdom, knowledge, and versatility to write a thoroughly stimulating and informative book on solar energy. Naturally, the author is at his very best in the chapter on the photochemical conversion of solar energy. In order to utilize photochemical reactions for the use of sunlight, the chemical reaction must be endothermic with high quantum yield and reversible. For conversion to electrical energy, electrons must be transferred photochemically from a low energy to a high energy level. The author points out a number of promising avenues of research on the photochemistry of solar energy conversion.

Although the total amount of solar energy incident on the earth is impressive, it will not be utilized, except in special cases, because of the high cost of collecting it and the high investment required for solar devices. Daniels expects that, as fossil fuels are depleted and as mass production of solar equipment reduces costs, solar energy will compete favorably with fossil fuels. He honestly recognizes that this utilization will come slowly at first and primarily in economically