early resolution will lead to great good.

There is absolutely no evidence that low-temperature storage and recovery procedures will be possible in the near future with live human beings, let alone dead ones. Arguments based on appeal to authority are irrelevant and misleading. Does Ettinger think that force equals mass times acceleration simply because so eminent a man as Newton has said so? And Ettinger taught physics for more than 10 years!

The discussion of the legal, religious, economic, and philosophical problems that arise along the road to immortality might be entertaining in another context. How much will the processing cost? What about the birthrate? Would refusal to be preserved be tantamount to suicide? If the parts of a man are progressively replaced with artificial substitutes, is it still the same man?

Perhaps the author has been pulling our legs. Maybe it's science fiction after all. The publisher must have fooled us with the dust cover.

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Geobotanical Mapping

Short Guide to Geo-Botanical Surveying. S. V. Viktorov, Ye. A. Vostokova, and D. D. Vyshivkin. Translated from the Russian edition (Moscow, 1959) by J. M. Maclennan, Pergamon, London; Macmillan, New York, 1964. xii + 158 pp. Illus. $9.

Guide for Surveying Phreatophyte Vegetation. USDA Handbook No. 266. J. S. Horton, T. W. Robinson, and H. R. McDonald. U.S. Department of Agriculture, Washington, D.C., 1964 (order from GPO, Washington, D.C.). 37 pp. Illus. 20¢.

At an early stage in any study of natural resources, an appraisal of the distribution and characteristics of the resource is necessary. Appraisal and survey of the topography, geology, water, and soils of the United States were started during the last century and are continuing today. Why a comparable appraisal of vegetation is simultaneously disregarded is a puzzle. Russia, in contrast, is well along in mapping vegetation and relating the plant cover to the environment. In this book, *Short Guide to Geo-Botanical Surveying*, different methods of mapping and of collecting and compiling data are described in detail.

The methods are familiar to all geologists and foresters. Reconnaissance, to familiarize the investigators with plants and their environmental relations, is followed by detailed observations along transects, usually supplemented by studies of aerial photographs and observation from airplanes. Transect surveys are made along lines drawn on base maps or photographs across the trend of the topography to insure sampling of most habitats. Grid surveys are used to compile large-scale maps where detail is required. All habitats are observed in continuous outline surveys that provide the greatest detail and accuracy. Vegetation types are defined by the dominant species.

Special surveys emphasize problems peculiar to different vegetation types and to man's use of the resources at his command. Forest surveying is discussed, but no references to the American or Western European literature on the identification of trees and the estimation of their volume from aerial photographs are mentioned. Different methods of surveying bogs and wetland provide data for the peat industry, agriculture, road location, and hydrologic studies and show the value of these resources and the interest taken in them. Surveys to understand range problems consider grazing and hay requirements in semidesert, desert, and tundra regions. The authors recommend that desert vegetation be mapped by mapping different types of topography and inferring different vegetation types. Correlations between vegetation and topography, so inferred, are invalid, and error could be introduced into their mapping program.

Surveys of vegetation types associated with variations in hydrology, geology, and soils are made to stress the indicative value of vegetation.

To evaluate water loss by evapotranspiration, a measure of vegetation is essential, and the USDA Handbook No. 266, *Guide for Surveying Phreatophyte Vegetation*, goes a long way to aid in describing and measuring riparian vegetation in semiarid regions. The authors state that several methods of sampling and measuring vegetation are available, but they suggest a standard method so that separate surveys can be compared. Only after many data are collected can the validity of the method be judged, but it seems to be technically and statistically sound.

The two reports, appearing at the same time, are interesting in contrast. The USDA report is a straightforward, objective discussion of methods of describing, sampling, and measuring vegetation and of analyzing the results. The Russian report is vague, some of the methods are subjective, and it leaves the impression that a method is valid because it was suggested earlier. The translation is invaluable, however, because it provides us with information about what the Russians are doing in vegetation mapping.

The two reports may indeed be the stimuli needed to start an appraisal of a little known resource—wild plants.

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Science for the Layman

A Star Called the Sun. George Gamow. Viking, New York, 1964. xiv + 208 pp. Illus. $5.75.

This book is dedicated, in the words of its author, "to the memory of my book, *The Birth and Death of the Sun,* published . . . in 1940." He goes on: "Twenty-four years is much too long . . . for any book on a rapidly developing subject to stand its ground, and today *The Birth and Death of the Sun* is hopelessly obsolete." In fact, Gamow overstates the case here. In view of the fact that the earlier book was written when the great expansion of our understanding of the atomic nucleus had just gotten under way, and that the sun is essentially a gigantic nuclear reactor, Gamow's new book extends and fills out the ideas presented in the earlier volume, rather than superseding them. Our conceptions of the nature and life history of bodies like the sun changed far less from 1940 to 1964 than they changed from 1916 to 1940, and although *A Star Called the Sun* is more than a revision of its predecessor, the earlier book is recognizably its parent.

The book has seven chapters. The first tells how astronomers have determined the distance, size, mass, and surface temperature of the sun. The second introduces the most powerful and successful of all methods of solar investigation—spectroscopic analysis of light. Gamow presents the interpretation of the sun's spectrum in terms of modern atomic theory. The third chapter describes the solar surface as

it is observed and as analysis fills out observation. Chapter 4 extends our knowledge to the sun's interior, outlining the brilliant theoretical attack (to which Gamow himself contributed significantly) that has resulted in our now knowing more about the interior of the sun than we know about the interior of the earth. Chapter 5 gives our present understanding of the nuclear sources of solar energy. Chapters 6 and 7 turn from the individual sun (a middle-class, middle-aged star) to all the stars and consider their numbers, their varieties, and their life history.

This is the latest of Gamow's popular expositions of science. It has the Gamow virtues—direct chatty style, masterful use of analogy, vivid examples, clarity. It has also carelessness in detail that leads to occasional misstatements—for example, "the hydrogen absorption lines must be all but absent in the Fraunhofer spectrum" (p. 67), although the figure on page 31 shows these same lines among the strongest in the spectrum. And more seriously, it deliberately touches up historical and biographical details for effect, as an after-dinner speaker embroiders anecdotes—for example, the argument of Anaxagoras on the sun's distance (p. 3). Although Anaxagoras *might* have reasoned in this way, no actual record warrants this account. Finally, our knowledge of the sun has even today more "if's" and "perhaps's" than Gamow suggests. But if you are interested in the sun, read and enjoy this book.

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Chemical Technology

Organoboron Chemistry. vol. 1, *Boron-Oxygen and Boron-Sulfur Compounds*. Howard Steinberg. Interscience (Wiley), New York, 1964. xxxii + 950 pp. Illus. $33.

Organoboron Chemistry, volume 1, by Howard Steinberg, vice president and director of research for the U.S. Borax Corporation, contains 21 chapters covering all aspects of boron-oxygen and boron-sulfur chemistry. Volume 2 will treat the nitrogen compounds of boron, and volume 3 will cover the boron-carbon bonded compounds. The literature for volume 1 is covered from the beginning of work in this area to 1 January 1962. The monumental task encountered by the author is reflected in the 1709 references cited.

The subject matter is well organized. Chapters 1 and 2 are devoted to introductory material; chapter 3 is concerned with nomenclature; chapters 4 through 20 consider systematically and separately each specific class of compounds in which boron is attached to oxygen or sulfur (but not, at the same time, to carbon); and chapter 21 discusses hydrolytic stability of boron oxygen compounds. Particularly well presented and informative are chapters 3, 4, and 21. Chapter 3, "Nomenclature," contains the rules of nomenclature adopted for this book. This presentation is based on an American Chemical Society report, "The nomenclature of boron." The discussion presented in this chapter will hopefully help to systematize future nomenclature in this area. Chapter 4, "Symmetrical orthoborates of monohydric alcohols and phenols," covers the area that can be considered the backbone of boron-oxygen chemistry. The chapter contains more than 500 references and is by far the most comprehensive treatment of this important subject available anywhere. Chapter 21, "Hydrolytic stability," discusses a subject that, in recent years, has become increasingly important and interesting to those concerned with the applications of boron compounds. Singling out these chapters should in no way indicate that the other chapters are not as well written or informative. Undoubtedly each reader will prefer those chapters which reflect his own personal interests.

This is, of course, a comprehensive reference book rather than a textbook. However, the author presents mechanisms for many of the important reactions and discusses the merits of each mechanism in detail. What is perhaps an even more unusual feature is the author's evaluations of mechanisms reported in the literature. If a mechanism does not seem logical, or does not explain the facts in hand, the author proposes a mechanism of his own. And so the book is, to some degree, a treatise in which one can find an evaluation of boron-oxygen and boron-sulfur chemistry as well as a compilation of voluminous factual data.

There can be little question but that the author has succeeded in gathering, summarizing, and at times evaluating the tremendous amount of work in which the chemistry of boron-oxygen and boron-sulfur compounds are described. If the other volumes in this series maintain the same high caliber reporting, the series should represent an excellent standard reference on organoboron chemistry for many years to come. This volume represents a job well done, and I heartily recommend it as the most comprehensive source of information available in the areas of organoboron chemistry covered.

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Solid-State Physics

Low Temperature Solid State Physics. Some selected topics. H. M. Rosenberg. Oxford University Press, New York, 1963. xvi + 420 pp. Illus. $10.10.

A person shopping around today for a book on solid-state physics, of either the general or specialized varieties, has a large selection from which to choose. In view of this happy circumstance, one might seriously question whether one more book is worth the effort. However, one might expect a warm welcome to be accorded the present book. The author's credentials are known, and he has produced a general treatise covering only a few topics which are of particular interest to him, topics that are also largely at the forefront of present-day research on solids. Whether the reader feels that his expectations are fulfilled, though, probably will depend on his personal tastes vis-à-vis books of this kind.

Rosenberg has not written a textbook; neither has he written what the expert would regard as a particularly good reference book. He has written, however, a very good "cultural" or background book and by so doing has filled a definite present-day need. The tyro in solid-state physics today need never fear that he will not encounter the full mathematical development of the phenomena of solids. What the beginner usually does not encounter is a treatment with the mathematical facade stripped away and the phenomena presented as just plain physics. The author regards experimental observations as fundamental. He presents the lore of several important areas and proceeds to explain and unify things, using essentially physical reasoning. The results of elegant calculations are pre-