The appearance of this monograph is further testimony to the fundamental influence of É. Cartan on contemporary differential geometry, for the germs of all these ideas are contained in Cartan's work. It is regrettable, however, that the modern rediscoverers of Cartan pay so little attention to the contributions of his contemporaries, such as Eisenhart, Schouten, and T. Y. Thomas. These geometers wrote in a different idiom, and their lack of influence on contemporary differential geometry is one more illustration of the difficulties of communication among mathematicians, a situation toward the correction of which this monograph series is directed.

CARL B. ALLENDOERFER
Department of Mathematics,
University of Washington, Seattle

Clear and Perspicuous

Quantum Mechanics. vol. 1. Albert Messiah. Translated by G. M. Temmer. North-Holland, Amsterdam; Interscience, New York, 1961. xv + 504 pp. Illus. $15.

We may expect a great many new texts on quantum mechanics in the next few years. In spite of appearances, this is not because of frenetic solicitations by the publishers of science books but rather a response to a real need. Since the end of World War II—several books appeared at that time—there has been developed a large body of new material, stimulated by the demands of theory and experiment in nuclear structure and solid state and by results and speculations in the quantum theory of fields. These developments have also produced a greater emphasis on, as well as a deeper understanding of, some of the elements of the more traditional material. A new text is to be judged, in part in any event, by the extent to which it reflects these trends.

In this regard it will not be possible to give a complete judgment of Messiah's work, since only the first volume (and the table of contents for the second volume) is available in translation; but the portents are excellent. The treatment in the text is essentially elementary in nature. Nevertheless we find such topics as projection operators, interaction representation, the wave packet discussion of scattering, penetration factors and single particle resonances, the effective range approximation, harmonic oscillator in several dimensions, density matrix, creation and destruction operators, and, in the appendix, the theory of distributions. And whatever is missing seems certain, from its table of contents, to be in the second volume. The discussion of these topics, as well as of the more usual material, is clear, straightforward, and perspicuous.

I take issue with the author (and probably with the authors of all other quantum mechanics textbooks) in only one large matter—namely, the extensive section devoted to the statistical interpretation and the uncertainty relations. From this material the student will acquire the feeling that precise measurements are impossible in quantum systems. In fact, of course, very precise measurements are possible only because of the quantal nature of physical phenomena. It is this point that needs to be emphasized, not the musty atavistic to-do about position and momentum. Overdone, such discussions only become exercises demonstrating "Ask a foolish question—get a foolish answer."

In conclusion, this book is highly recommended, and I predict that this judgment will also extend to the prospective second volume.

HERMAN FESHBACH
Department of Physics,
Massachusetts Institute of Technology

ACS Symposium Volume

Retardation of Evaporation by Monolayers: Transport Processes. A collection of papers presented at the 1960 annual meeting of the American Chemical Society. Victor K. La Mer, Ed. Academic Press, New York, 1962. xviii + 277 pp. Illus. $10.

The general importance of monomolecular films of fatty materials is now well recognized by scientists in a wide variety of disciplines, for monomolecular films play a part in such diverse fields as boundary lubrication and cytolysis. Yet knowledge of the specific influence of monolayers is not nearly so widespread as it might be, considering the fact that the concepts involved in monolayer studies require a relatively slender knowledge of mathematics and physical chemistry.

One particular aspect of the behavior of monolayers, namely their influence on the transport of materials across interfaces, affects, or soon will affect, the lives of all of us, whether or not we are professionally concerned with monolayer studies. For the translation of small-scale laboratory experiments to large-scale conservation of our water resources has proved to be one of the more exciting incidents in surface chemistry in recent years, and the pioneering work in this area holds great promise. As one of the contributors to this book remarks, "evaporation from a stockwater pond often dissipates as much water as is used in a year by 500 head of cattle."

In a book which deals with research topics it is unusual to find that the first article is an address given by a United States senator (Senator Murray of Montana, in this case), but there is no incongruity in this. As Senator Murray points out, the conservation of our water resources is vital to the maintenance of our present standards of living and to the development of higher standards in many of the world's great continental areas.

Much of the emphasis in the articles is directed to the pronounced effect on the rate of evaporation of water produced by monolayers of hexadecanol and octadecanol. La Mer's own articles give clear descriptions of experimental methods of studying these effects as well as a coherent theoretical interpretation of results. A number of papers give a good account of the large-scale application of laboratory experiments to water conservation, here and in Australia. Successful and unsuccessful methods of forming the monolayers on a large scale are critically evaluated by various authors, many of whom draw attention to the frequent failures of experiments in which an unfortunate choice of solvent results in a porous, or very permeable monomolecular film. In R. G. Vine's article there are some striking photographs of the calming effects of monolayers of hexadecanol on the surfaces of lakes. On areas coated with a monolayer, the smooth reflections of light are in marked contrast to the disturbed, rippled appearance of the uncoated water.

There are several papers dealing with the effects of monolayers on the transport of gases across the water-gas interface. These will interest biologists who are concerned with animal life in ponds and lakes, but there is much in this particular subject which will also interest cell physiologists.

Contrary to what might be expected of a group of papers presented at a large meeting, the book is remarkably

free from the scrappy disjointedness that so often characterizes the results of publishers' overeagerness to rush into print *any* collection of papers presented at *any* meeting. No doubt this coherence is a reflection of the care used in selecting those who were invited to participate, but there is no doubt that much of the coherence also springs from the clear outline of the problems which is given in the rather long preface and from the skill with which the editor has arranged the papers.

The book is well printed and reasonably, though not completely, free of typographical errors. The photographs are particularly well reproduced. The book can be warmly recommended to a wide audience of physical chemists and biologists as a good summary of the considerable progress that has been made in this important interdisciplinary subject.

ERIC HUTCHINSON
Department of Chemistry,
Stanford University

Comprehensive and Balanced

International Symposium on Mining Research. vols. 1 and 2. George B. Clark, Ed. Pergamon, New York, 1962. 871 pp. Illus. $30 per set.

These volumes, which reflect the proceedings at an international symposium on mining research, held at Rolla, Missouri, in February 1961, consist of 50 papers. The symposium was the most comprehensive ever attempted in its field and included participants from Austria, Czechoslovakia, France, Germany, India, Japan, Sweden, the United Kingdom, the United States, and the U.S.S.R. Subjects treated include the fields of blasting (23 papers), drilling (2), rock mechanics (9), ground support (3), safety and health (2), mineral identification (3), sampling (3), drill-steel behavior (3), gyrosurveying (1), and pipeline transportation of solids (1). The subjects reflect a judicious balance of theory, laboratory tests, and field determinations. Although some of the articles have appeared (in whole or in part) elsewhere, there is enough new material of merit to make the book valuable to persons interested in the fields mentioned above, if they are willing to pay a rather high price.

EVAN JUST
Mineral Engineering Department,
Stanford University

Initial Instruction

An Introduction to Physical Oceanography. William S. Von Arx. Addison-Wesley, Reading, Mass., 1962. x + 422 pp. Illus. $15.

William Von Arx quotes a statement made in 1725 by Count Marsigli, saying that many scientists were dissuaded from a study of the sea by the complexity of its problems. These are still difficult, but fortunately there have been many who see in them a fascination and a challenge and who are prepared to accept the difficult and uncontrolled nature of the environment with which they work. This is established in the introductory chapter and an appendix which take the student from Greek beginnings through to the last decade in a useful survey of the more notable contributions to geophysics. These appear to increase exponentially with time, in common with other sciences.

In these days it appears that oceanographers must needs be specialists in one of the basic disciplines, but it is of some importance that they have an understanding of other fields than their own. A theoretical hydrodynamicist is not in general likely to regard biology as a useful element in his theories, whilst it is quite conceivable that the physical oceanographer would be aided by a study of biological factors.

The author has for many years been on the staff of Woods Hole Oceanographic Institution and is also professor of oceanography at Massachusetts Institute of Technology. He should be in a strong position to assess the needs of students. The result is a book in which the fluid mechanics of the oceans—advective and convective processes, tides, and the dynamics of the Gulf Stream—are interspersed in roughly equal proportions with a discussion of the environment—the properties of seawater, the stratification of the oceans, the earth's rotation, and its geology. Physical argument is used in the main, and mathematical formulas are at a minimum (this is not always an advantage).

Many of the topics treated are left tantalizingly "in the air." This may well leave some readers with only a hazy idea of the principles and methods of oceanography, but it should stimulate the serious and intelligent student to further enquiry, aided by the study questions and many references at the end of each chapter. The author's own interests are to the fore in a perhaps over-detailed discussion of electromagnetic methods of measuring currents and in an excellent chapter on laboratory models of ocean circulation (of which the author was a pioneer). Comments on such practical problems as how to find out where one is, with reasonable accuracy, in the middle of an ocean are a welcome feature.

I believe that Von Arx has been successful in producing not a textbook but a true *introduction* to oceanography. It only remains to say that unfortunately the price of the book makes it quite possible that it will not reach a well-deserved place on the shelves of many of the students for whom it is intended.

JAMES CREASE
National Institute of Oceanography,
Wormley, Godalming, Surrey, England

Not Recommended

Russian-English Chemical Dictionary. Eugene A. Carpovich and Vera A. Carpovich. Technical Dictionaries, New York 31, 1961. 352 pp. $14.

To do justice to a dictionary, it should be evaluated only after it has been used for some time. This procedure, however, is not practical if the appearance of the book is to be announced promptly. The best that can be done under such circumstances is to look for randomly selected words. In such a search of this book, I found that the following words are missing: газопоглотитель, золотник, капуста (as used in coking), каптаж, каракатица, люфт, нуль, прядево, рухляк, смерзаемость, and сноп. The words: величина, держатель, пилюля, роданистый, сернокислый, сернова-тистый, соприкосновение, and others appear only in phrases, not separately. The Russian нутч-фильтр is preferably translated *suction filter*. The English *vehicle-motor gasoline* (page 10) and *food flank* (page 35) are obviously erroneous. However, no dictionary is perfect, and each one has its advantages. Whatever the advantages of this dictionary, they are not to be found in its typography and makeup. The makeup of the English text is sloppy. Nothing is gained by omitting periods in abbreviations, and much clarity is lost thereby. Abbreviations are best put in italics. In this dictionary they are so indicated on page 5, but nowhere else in the body of the dictionary. When a word or phrase is continued on another line otherwise oc-